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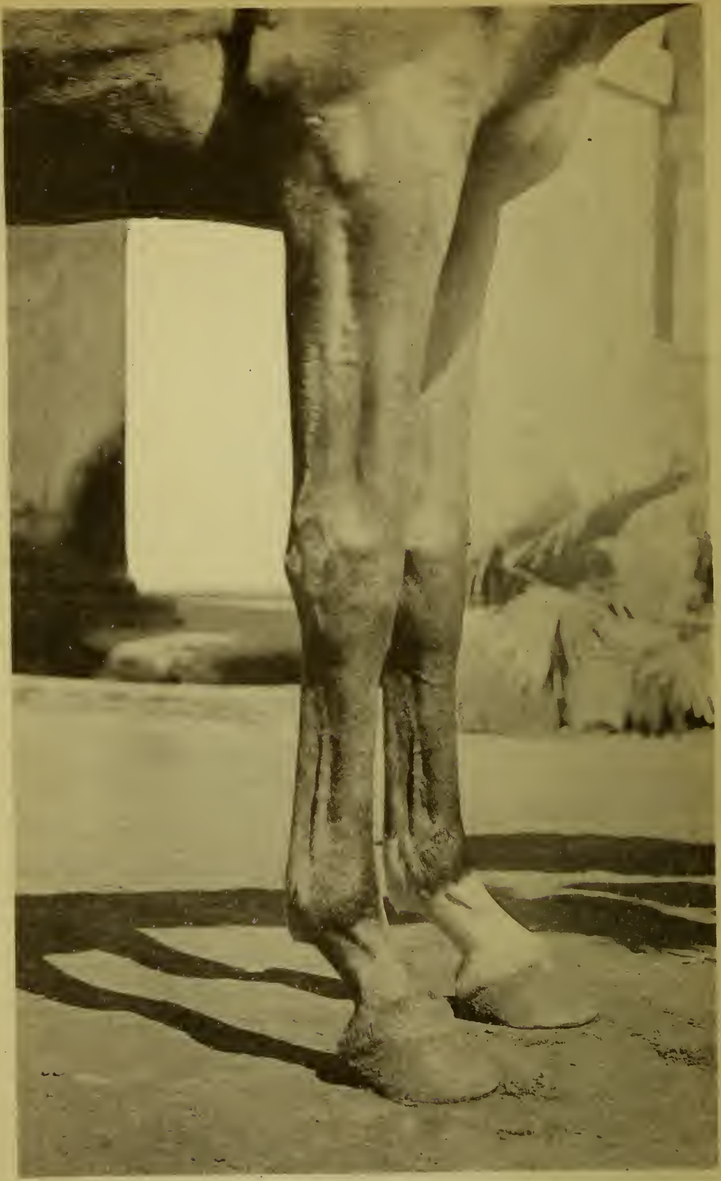

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VETERINARY NOTES FOR HORSE OWNERS.

A MANUAL OF HORSE MEDICINE AND SURGERY
WRITTEN IN POPULAR LANGUAGE.

BY

M. HORACE HAYES, F.R.C.V.S.,
Late Captain "The Buffs,"
AUTHOR OF "RIDING: ON THE FLAT AND ACROSS COUNTRY."
"ILLUSTRATED HORSE BREAKING,"
ETC.

ILLUSTRATED.

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PREFACE TO THE FOURTH EDITION.

The chief new matter in this Edition is articles on Contracted Heels, Donkey's Foot Disease, Forging or Clicking, Rheumatic Joint Disease, Abscess, Dislocation of the Shoulder Joint, Inflammation of the Mouth and Tongue, Flatulent Distension of the Stomach, Twist of the Intestines, Relapsing Fever, Cape Horse Sickness, Horse Syphilis, Rabies, Megrims, Staggers, Epilepsy, Sunstroke, Poisoning, Castration by the Ecraseur, and Mechanism of the Foot (in Chapter on Shoeing).

The remarks on Treatment of Sprain (with special reference to cotton wool bandaging), Grease and Cracked Heels, Wounds and their Results, Broken Wind, Roaring, Rheumatism and Neurotomy have been re-written. The whole work has been revised with an amount of care, of which my readers will be the best judges.

There have been twenty-nine new illustrations added, of which Figs. 2, 5, 6, 9, 10, 13, 14, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, and 31 have been drawn, from photographs, by Mr. J. H. Oswald Brown, to whom I tender my best thanks for the skill and trouble he expended on them. Figs. 34, 35, 37 and 38 have been taken from a pamphlet on Horse Shoeing written many years ago, by the late Mr. W. Thacker, M.R.C.V.S.; Fig. 33, from MM. Goubaux and Barrier's *L'Extérieur du Cheval*; and Figs. 41, 42, 43 and 44 from M. Signol's *Aide Mémoire Vétérinaire.* Fig. 36 is a design of my own.

Allowing for an extra line on each page, there are about 110 more pages in the present Edition, than in the last one.

All questions respecting Soundness, and the short Chapter on "Age of the Horse as shown by his Teeth," which appeared in the former Edition, have been omitted; as these subjects have been specially treated in my book, *Soundness and Age of Horses*, which has since been published.

I now venture to offer this book to the public, as a fairly comprehensive Manual of Horse Medicine and Surgery, in the hope that it will prove useful both to amateurs and to Veterinary students.

M. H. HAYES, F.R.C.V.S.

JUNIOR ARMY AND NAVY CLUB,
ST. JAMES'S STREET, LONDON, S.W.
16*th August*, 1891.

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VETERINARY NOTES.

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Sprains.

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Theory of Sprain.

Structures Liable to Sprain.—The structures most liable to sprain are muscles, tendons, and ligaments.

Tendons or *Sinews* serve the part of strong, inelastic cords to tie muscles down to bones. The tendon, at one end, is spliced on to its muscle; while, at the other end, it adheres firmly to the surface of the bone.

Muscles, by their power of contraction, give rise to the movements of the body. Thus, before the foot can be raised—speaking in general terms—the muscles which are connected with the back tendons, and which lie at the back of the fore-arm, while they take their origin just above the elbow, contract to, say, two-thirds of their relaxed length on being stimulated by their nerves, so that the foot, which is connected to the ends of the back tendons, gets forcibly pulled up. When the stimulus ceases to act, the muscles relax, and the foot comes again to the ground.

The *ligaments* which we have to consider, are similar in their nature to tendons, being made up of strong, dense fibres of inelastic material. Their office is to bind together various structures. Thus, in the knee there are two *lateral ligaments*, which are fixed, one on each side of the joint, to the ends of the bones, immediately above and below it, so as to prevent it from having side play. *Capsular* ligaments cover the joints and protect the lubricating apparatus, which is inside, from injury. The suspensory ligament (see Fig. 1) aids in preventing the fetlock from coming down on the ground when the horse puts weight on the foot.

Waste and Repair.—There is a constant process of waste and repair going on throughout the body. The blood is expelled by the contraction of the heart, through the arteries, which are split up into innumerable branches, and finally terminate, as a rule, in *capillaries*, which are extremely minute tubes of about $\frac{1}{3000}$th of an inch in diameter, and, probably, do not exceed $\frac{1}{40}$th of an inch in length. The veins, which are very small at first, take their origin from the capillaries, and gradually uniting with each other, becoming larger and larger, and fewer and fewer, at last arrive at the heart by two main branches and a few small ones.

Blood is composed of a number of red discs of microscopic size, which impart to the blood its characteristic colour; a comparatively small number of colourless discs; and a watery fluid, which holds in a dissolved state all the necessary materials for repair and development required by the system. This fluid transudes through the extremely thin walls of the capillaries—which are found, speaking generally, in countless numbers in every part of the system—and thus nourishes the various tissues. The portion of the fluid that is not required for repair, passes into the veins, and is carried by them to the heart. The waste and broken-up material is taken into the veins, and is finally got rid of by the various excretory organs. In health, the amount of watery fluid transuded through the walls of the capillaries is, probably, not much in excess of what is required for the due nourishment of the surrounding tissues; any extra supply, within moderate limits, being readily taken up by the *absorbents*. Every part of the system is provided with numerous small vessels called *lymphatics*, the office of which is to carry into the veins broken-up and waste material, which is finally got rid of by means of the kidneys, lungs, skin, etc. As the smaller veins, especially those near the surface of the body, also possess the power of absorption, we may class them and the lymphatics under the general term of absorbents.

Definition of Sprain.—A sprain is an injury to ligament, tendon, muscle, or joint, and consists in the more or less extensive tearing of fibre; in excessive tension on fibre; or in displacement. We may include for convenience sake under this heading certain bruises, as when a horse "hits" himself on the back tendons, without division of the skin.

Nature of Sprain.—Ligaments, as well as tendons, may break right across; or "they may tear, especially small portions of them, here and there, so that the whole thickness is not broken across at any one spot; but they will not stretch. It is true that under certain conditions they do become elongated, but this only happens when the strain is continuous, and lasts for some considerable time. A slight degree of inflammation sets in then, and under its influence the fibrils soften, until they yield. Sometimes ligaments give way in the middle, but it is more common for them to separate from the bone, or to wrench from it a small thin scale corresponding to their attachment. This is due in part to the arrangement of their fibres. In the centre they are woven closely together, and form a rounded bundle of great strength. At the ends they spread out like a fan, so as to secure a wider attachment. A ligament that can resist successfully a straight pull of great violence, yields at once to a twisting force of much less severity; because this pulls on the fibres unequally, one by one, and tears them from their attachment" (*Moullin*).

When a sprain takes place, there is, according to the modern view, rupture at the seat of hurt of certain blood-vessels, which pour more or less of their contents into the surrounding tissues, so as to cause distension. Owing to the existence of an injury which it is the duty of the vital forces to repair, there is an increased flow of blood, which gives rise to a heightened temperature, and to an increased exudation of lymph, which further augments the degree of swelling. The pain that is present is chiefly due to pressure on, and rupture of, nerve fibres. The *tension* caused by the lymph and extravasated blood, if continued long, causes the fibres of the affected structure to stretch and soften, until, after a time, they become converted into a gelatinous mass, which, subsequently, turns into fibrous tissue. This new formation, in the case of a ligament, or tendon, lacks the strength and compactness of the original; and, in that of a muscle, the contractility which the destroyed fibres possessed. The new fibrous tissue is, more or less, spread out, and is, consequently, apt to cause loss in the power of movement, owing to its gluing the parts together. If the structure become again sprained, it will, in its weakened condition, be far less able to resist the force of the inflicted violence, than before. Whatever view we take of the nature of sprain, the fact remains that tension, by causing stagnation of blood, produces disorganisation of tissue, and should therefore be relieved as quickly as possible.

How Sprains Occur.—In the very common case of lameness due to an acutely swollen fetlock, caused particularly by fast work on hard ground, and occurring, usually, to horses that have comparatively straight pasterns, we have, I venture to think, a good instance of sprain to ligament, brought on by continued and excessive pressure from the presence, in the part, of an abnormal amount of synovia (joint oil), and, probably, of lymph. Concussion here appears to be the exciting cause.

In other cases, as a rule, sprains occur only by accident—such as a sudden twist at a moment when the muscles are unable to act quick enough to save the part—or when the muscles have become so fatigued that they are, in this instance also, powerless to preserve its stability. The practical inferences are obvious.

Experienced horsemen will, I think, agree with me that sprains of the tendons and ligaments of the fore-legs—which are the most common accidents to which horses employed in fast work are liable—come on, as a rule, gradually, and as a result of the injured structures having become weaker and weaker. The history of the case is usually as follows: On previous occasions after exercise, heat and tenderness were observed in the part, which symptoms more or less subsided on a short rest being given, and by the aid of the ordinary remedies, so that the horse was enabled to continue work, off and on, until the day on which the final accident occurred; or, in other words, until the part, on account of the presence of continued inflammation, or continued tension (according to the view we adopt), became too weak to stand the strain of its ordinary work, or of work which would have been well within its power had it been in a healthy condition. Horses out of work are much more liable to sprain than those that are "fit and well;" for the more a healthy part is exercised, short of injuring it, the more blood is brought to it, and, consequently, the stronger it becomes; but, if exercise be curtailed, any violent or unaccustomed exertion will be liable to injuriously affect it.

Unprincipled persons wanting to sell a horse with a thickened tendon or ligament, sometimes try to make out that the leg is as sound as when the animal was foaled, on the plea that the part has become "callous," an expression which the buyer should understand to mean "incurably weak;" for here we have, as a rule, a stage, long past that in which repair was possible.

Inflammation.—When inflammation occurs, the circulation of blood in the affected part becomes impeded, the blood-vessels become gorged with blood, and there is an excessive escape of watery fluid into the neighbouring tissues. This fluid is not alone superabundant in quantity, but it also possesses the property of rapidly coagulating, and hence differs from the fluid exuded under healthy conditions. It may become absorbed before undergoing any change; or *pus* (matter) may be formed, by, probably, the white corpuscles which have escaped from the blood-vessels along with this lymph.

Many surgeons consider that sprain is very rarely accompanied by inflammation; and that the resulting swelling, heat, pain, and redness are due to causes which I have already mentioned. Treatment based on the inflammatory character of sprain has, I must confess, been more or less a failure. In fact, our previous non-success as veterinary surgeons, in this line, has been a serious reflection on the usefulness of our profession. In human practice, until very recently, surgeons were no better than ourselves in this respect. When, on the other hand, we endeavour to repair the hurt, according to the modern view, we obtain thoroughly gratifying results.

Principles of Treatment.—In the case of sprain, were there but little extravasated blood and exuded lymph—the presence of which fluids is the cause, as we have seen, of the softening of the injured structure, and of the retardation of repair—the broken fibres would unite as completely, other things being equal, as the ends of a bone, in the case of a simple fracture. Hence, it would appear that our first efforts should be directed to check the accumulation, in the part, of these fluids, and to hasten their removal from it. With these objects in view, we may apply, in the first instance, *hot*, or very *cold water;* the effect of both being to check the circulation of blood, and, consequently, to hinder the effusion of blood and lymph into the tissues at the seat of injury. The value of hot water (as hot as it can be borne) in checking the flow of blood is well recognised in surgery. A couple of minutes will suffice to produce the required effect. A higher temperature, or a longer period of its application, might cause injury to the skin. The value of hot water "is greatest when the injured part lies near the surface, particularly in the case of tendons, which, like those on the back of the hand [or like the back tendons of the horse], run a long distance down into the fingers, lying immediately under the skin the whole way. It must not be forgotten that the sensitiveness to heat increases with the area exposed. It is not a bad plan to place the limb in hot water, and then raise the temperature rapidly by adding more, until it is as high as the patient can stand, taking care to stir it round all the while, so as to distribute the heat evenly" (*Moullin*).

Cold acts in checking the effusion of blood and lymph, by causing contraction of the muscular coats of the vessels. The application of cold should be stopped before reaction (*i.e.*, stimulated circulation) sets in; as that would of course do harm. Cold should, therefore, be employed only in the very early stages of a sprain, and for but a short time. It may be applied by means of iced water, crushed ice, or by a jet of cold water. The ordinary wet bandage is worse than useless; unless, indeed, it be of a single thickness of cloth, and be kept wet by some refrigerating lotion. In some old, and, if I may use the term, chronic cases of sprain, the continued application of cold acts well, seemingly by checking the blood-supply of the part, and, consequently, the exudation of lymph.

Moist heat relieves tension by rendering the skin soft and distensible.

Pressure in the treatment of sprains is of great value; as it controls and disperses effusion, and hastens the removal even of consolidated exudation. It should, however, be uniformly applied. By the common method of attempting to make use of pressure, say, on a fetlock, by means of an ordinary bandage, we apply the pressure only on bony prominences, and not on the soft parts which require it. In the same manner, when bandaging the limb between the knee and the fetlock, we fail to obtain lateral pressure, or pressure on the suspensory ligament. By the cotton-wool (see page 27) plan of bandaging, or by the employment of a charge (see page 29) properly put on, these faults are obviated.

Physic acts beneficially by diminishing tension, in that it removes a large quantity of watery fluid from the blood, and, in this manner, clears the way for the absorbents to take up any superabundant fluid there may be in the tissues.

Drinking water should be allowed in a full supply, in order that the blood may be maintained in a sufficiently fluid state; a condition which is indispensable to health. There is no danger of the horse drinking too much; for any surplus will be quickly excreted by the kidneys, lungs, skin, etc.

Diuretics (nitre, for instance) purify the blood by stimulating the kidneys, the office of which is to remove waste material from the blood along with the urine. Nitre and other salts aid in keeping the blood fluid.

Laxative food (green fodder, carrots, etc.) has a "cooling" effect: 1, by acting on the bowels; 2, from being poor in substances, such as albumen, which are apt to "heat" the system; 3, from containing certain salts which, on becoming absorbed into the blood, assist in maintaining its fluidity.

Starvation, within healthy limits, we may see from the foregoing remarks, may be enforced with advantage in the acute stage of sprain.

Local blood-letting aids in relieving tension.

Belladonna, as an external application, relieves tension by stimulating the superficial blood-vessels.

Passive exercise, which in the case of a limb, may be performed by gently bending and straightening the joints, with the foot off the ground and the animal standing still, should be carried out, after the first day or two, a couple of times a day; in order to prevent the formation of adhesions.

Hand-rubbing should be put into practice after a sprain, as soon as it is possible to employ it without inflicting pain. Its use appears to be due to the pressure it exerts; to the fact of its stimulating the action of the superficial vessels; and to its mechanical effect in quickening the circulation of the absorbents. The marked increase of temperature from hand-rubbing, is a convincing proof of its stimulating power on the blood-vessels. For the proper method of hand-rubbing, especially, as applied to the legs, see page 559.

Rest from all movement from one place to another is of the utmost necessity in the successful treatment of sprain, and should be enjoined until all heat and tenderness have disappeared; for repair can take place only during rest. It should, however, not be maintained too long, lest adhesions form. *Exercise* of a very moderate description, and judiciously regulated, should be commenced shortly after heat and tenderness have left the part; as it will then do good by stimulating the nutrition of the part and by preventing adhesions. It should, of course, be of a nature that will, in no way, be liable to cause a recurrence of the acute symptoms. In a case of a swollen limb, which, after exercise, " fines down " for a few hours, only to get as big or bigger than before. I cannot see what good it does. On the contrary, I think it must do harm; unless, indeed, pressure be applied by cotton wool or other suitable material, as soon as the swelling subsides from exercise.

Blistering is a remedy of the usefulness of which in sprains I have grave doubts. If it be employed during the acute stage of sprains of the back tendons and suspensory ligament, it will, almost to a certainty, cause a permanent thickening of the part.

Firing, especially when deep, seems to produce a good effect in many old cases of sprain. It is probable that it affords more or less permanent pressure on the injured part, by causing contraction and adhesion of the overlying structures. The portion of skin or flesh which is burned by the firing iron is replaced by fibrous tissue, the property of which is to contract, as we may see exemplified by the " drawn " appearance of the skin of a person's neck or cheek which has healed, after having suffered from a severe burn. A portion of the benefit obtained in many cases from firing, is undoubtedly due to the long rest which it necessitates.

General Treatment of Sprains.

We should give rest, as quickly and as completely as possible, to the affected part. With this object in view, we may put the animal in *slings*, especially if he be very lame behind; for, when thus affected, a horse will rarely lie down. If the injury is in one of the legs, we may apply a *high-heeled* shoe, which is one having calkins about two inches high and connected together by an iron bar, so as to afford a firm bearing to the foot, and also to prevent the calkins from catching in the bedding, etc. As this shoe will tend to bend the leg, to the foot of which it is attached, it will naturally aid in giving rest to those tendons and muscles, the office of which is to raise the limb from the ground, and also to the ligaments that maintain the stability of the joints when weight is thrown on the leg.

When it is expedient, though not convenient, to put on a high-heeled shoe, a full supply of sawdust should, if obtainable, be substituted for the ordinary straw bedding; as the animal will be able to assume an easier position for his sore leg on the former, than on the latter material. In all cases, care should be taken that the sound limb is not injured by undue weight being thrown on it.

Cold or hot water (see page 26) may be applied, without delay, to the part. If practicable, we should lose no time in applying pressure of a thoroughly uniform nature. This may be done by enveloping the part in a mass of cotton wool, or other soft and elastic material, and then tightly bandaging it (see page 27.) If we cannot do this, we may diminish the tension by the employment of leeches, or by fomentations. After fomenting, the part may be dried, and a liniment—composed of extract of belladonna and glycerine, of the consistence of thick cream—may be gently rubbed in. This may be put on a couple of times a day.

In the case of a severe sprain to a horse that is "full of corn," it is well to give a dose of physic, in the first instance, after clearing out the lower part of the bowel with an enema or two.

Laxative food, such as green grass, lucerne, carrots, bran, and linseed mashes, should be given instead of corn. A judicious amount of starving will, as a rule, act most beneficially.

The part may be hand-rubbed, with more or less pressure, a few times every day; care being taken that the skin is dry at the time; for if this precaution be not observed, the friction will cause the hair to come off.

We may apply a charge (see page 29) to the part, two or three days, or later, after the injury.

When uniform and well regulated pressure can be applied to the part, I think it best to trust to it alone. At the same time, I must remark that many experienced veterinary surgeons are partial to the employment of cold water, after the disappearance of all pain and unnatural heat, in order to restore tone to the injured structures. It can be well applied by a jet from a hose, which may be allowed to play on the part for, say, a quarter of an hour, four or five times a day. In India, we may substitute for the hose a water-skin, the water in which may be cooled by placing it in the shade, for some time, exposed to the wind. Standing a horse, whose legs are affected, in a running stream for considerable periods, often proves beneficial; care being taken that he does not catch cold.

If all our efforts prove unavailing to render the part sound, we may fire deeply; but should do so only when all reparative action has apparently ceased, say, two months after the accident. If any heat remain, the part should be cooled down by means of cold applications, before using the firing iron.

After the part has recovered from the injury as far as circumstances admit, the owner can exercise his own judgment in bringing the horse on to work again, giving corn, using bandages, etc.

Sprains of the Suspensory Ligament, Check Ligament, and Back Tendons.

For convenience sake, we will consider these accidents under one heading, after glancing at the position and offices of the respective structures.

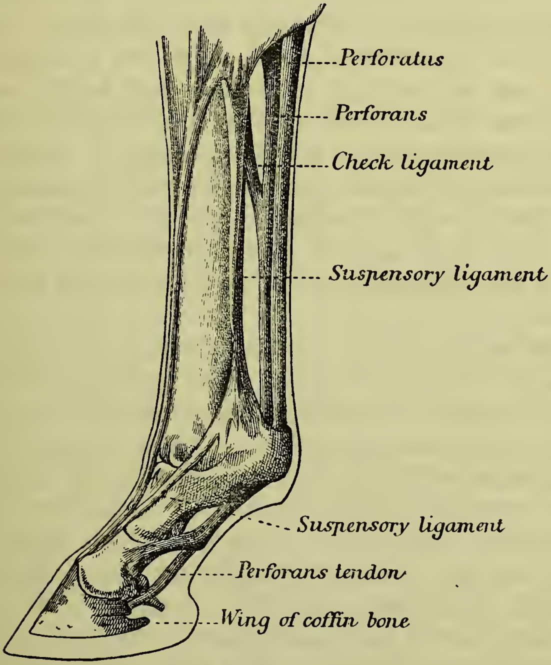
Anatomy of the Suspensory Ligament.—The suspensory ligament is a strong, inelastic, fibrous cord which lies at the back of, and close to, the cannon bone. It originates at the head of this bone and at the lower row of the small bones of the knee. It runs down the groove formed by the two splint bones, for about two-thirds of the length of the cannon bone, then divides into two branches, which become attached to the summits of the sesamoid bones—that lie at the back of the fetlock joint—and extend downwards and forwards. These branches unite in front of, and at about the middle of the pastern, and become strongly attached to the tendon of the muscle which extends the foot.

Acting by the mechanical advantage afforded by the sesamoid bones, the suspensory ligament serves as a powerful brace for preventing undue extension of the fetlock joint.

Anatomy of the Back Tendons and Check Ligament.—There are two back tendons, which originate from muscles that help to raise the foot from the ground. From the knee, they run down behind the suspensory ligament, one overlying the other. The posterior tendon (the perforatus) forms a sheath for the passage of the other (the perforans) at the back of the fetlock joint, and becomes attached to the sides of the short pastern bone. The perforans tendon is joined half-way down the cannon bone by a powerful ligament which originates at the head of that bone, and at the lower row of the small bones of the knee, having, in fact, almost the same origin as the suspensory ligament. This so-called *check ligament* forms with the lower part of the perforans tendon a strong brace for preventing undue obliquity of the pastern, its office being very similar, but less in degree, to that of the suspensory ligament. The perforans tendon, after affording attachment to the check ligament, passes over the

FIG. 1.

BACK TENDONS AND SUSPENSORY LIGAMENT OF FORE-LEG.



sesamoid bones, which act as a pulley for it, then down the back of the pastern bones, over the third sesamoid or navicular bone (another pulley), and is finally inserted into the base of the coffin bone.

On taking a side view of a "clean" leg of a horse (see Frontispiece), we ought to see the suspensory ligament rising close above the fetlock joint, between the cannon bone and back tendons, and extending nearly two-thirds of the way up to the knee; the skin should be firmly bound down to it; and it should stand clear and well-defined from bone and tendon, as if it were cast in a mould, so that the leg, from knee to fetlock, should have a fluted appearance. When there is difficulty in marking the course of the ligament with the eye, or with the hand, according as the leg is free from long hair, or is well "feathered," we may doubt the capability of the leg for standing continued fast work.

The tendons and ligaments of some legs, particularly those of underbred horses, are, however, sometimes covered with an unusually large amount of loose tissue, which causes the legs to have a more or less "filled" appearance, without, however, affecting the strength of these structures. The apparent "cleanness," due to absorption consequent on old age, which many stale, worn-out legs exhibit, should not be mistaken for strength and freshness. The condition of the knees and fetlocks will aid the observer in forming a correct judgment on such cases. The knees show the effects of work by being bowed and shaky; the fetlocks, round; and the pasterns, upright.

As tendons and ligaments are, naturally, almost always sprained at their weakest points, we find that when the suspensory ligament "goes," it usually does so, at one or at both of its branches just above the fetlock joint.

The only parts at which, from mechanical considerations, it appears that the perforans tendon can be sprained, are its attachment to the coffin bone, and the point where it passes over the sesamoid bones. On carefully examining the perforatus—the hindmost one of the two back tendons—one may reasonably conclude that it can rarely become injured from over-stretching; although it is peculiarly liable to suffer from blows from the hind foot.

Thus, we have from undue extension of the foot, as in galloping, or in draught when going down hill with a heavy weight behind, injury of the suspensory and check ligaments, and of the back tendons (perforans). And from excessive labour in flexing the foot—as in galloping through heavy, "holding" ground, especially with a welter weight up, or in drawing heavy loads—we have sprain of the perforans tendon, by reason of the violent strain which is thrown on it by the contraction of its muscle being forcibly resisted.

Cart horses are most liable to sprain the check ligament; while those doing fast work usually injure the suspensory ligament; a fact of which I venture to offer the following explanation.

Manner in which the Suspensory Ligament gets sprained in Galloping.—On level ground, the heel of the foot comes first to the ground. When the horse is fresh and untired, the muscles to which the perforans and perforatus tendons are attached, contract with such precision, that the foot is "picked up" (flexed) before undue strain can fall on the suspensory ligament; in fact, these tendons act as assistant braces to it. But if the pace be continued, the horse will "dwell" more and more in his stride, until the muscles which move the flexor tendons, having become gradually fatigued, will at length be unable to contract, with sufficient quickness, to save the suspensory ligament from undue strain. Besides this, though the muscles get tired, the ligament does not experience the sensation of fatigue ; hence, the horse throws increased weight on the latter, in order to save the former. We may easily imagine how great this strain must be, in the case of a race-horse struggling home during a desperate finish. When the muscles which flex the fore-legs become tired, a considerable portion of the weight of the horse and his rider, which is propelled forward by the hind, has to be borne by the suspensory ligaments of the fore-legs. No wonder then that race-horses, when they break down, do so, as a rule, in the last furlong, especially if the ligament has been previously injured. We may also readily see why they are more apt to break down, when out of work, than when in condition.

A striking proof that as long as horses are not fatigued, they are not liable to sprain their suspensory ligaments, is afforded by the fact that animals which have been rendered totally unfit for the turf on account of this accident, often make serviceable chargers for ordinary parades, on which a gallop is seldom required to be made beyond a few hundred yards, and is always executed at a steady, " collected " pace.

We find in training race-horses with weak suspensory ligaments or back tendons, that the only safe method for giving them fast work is by short and repeated gallops. For instance, instead of sending such a horse a mile gallop, we might give him three spins of three furlongs each, with intervals of from a quarter to half an hour, in order to allow the muscles to recover their strength and tone.

I think we may take for granted the existence of more or less perfect harmony between the strength of the muscles of the fore and hind extremities, and that, if a horse were turned loose and allowed to gallop, the muscles of the latter would get fatigued as soon, or nearly as soon, as would those of the former. Here, the diminished assistance which is afforded by the perforans and perforatus tendons to the suspensory ligaments, would, when their muscles became tired, be compensated for by the decreased strain of the slower pace. But if we put a jockey up, this harmony is at once destroyed; for, then, the weight being thrown forward by the position assumed in riding, the flexor muscles of the fore-legs will have far more work to do, in proportion, than the muscles of the hind, and will, consequently, become more quickly fatigued. The opposite to this is often the case with the troop horse, who, being ridden on the curb, and being kept up to the bit by the pressure of the legs, is apt to relieve the forehand at the expense of the hocks.

When a horse is galloped on hard ground, the sudden jar experienced at each stride, is liable to strain some of the fibres of the ligament, and, thus, to bring on the gelatinous condition to which we have previously alluded. Soft ground gives more time for the muscles which are attached to the perforans and perforatus tendons to contract, and thus to save the ligament; but on hard ground, the severe strain falls on it with extreme rapidity; hence the danger of inducing sprain of the suspensory ligaments by galloping on such soil.

Both from theoretical considerations, and from practical observations, I think I may lay it down as a rule that the suspensory ligaments of saddle-horses do not get sprained, except when the flexor muscles of the fore-legs become fatigued in the gallop, or when the animal is worked on hard ground. The exceptions will, probably, be included among cases where undue or unexpected extension of the foot takes place from the horse treading on some inequality, or from landing on a hard spot when leaping. The lessons to be drawn from these considerations are too obvious to need detail.

Oblique Pasterns.—The longer and more oblique the pasterns are, within reasonable limits, the less liability is there of the horse spraining his suspensory ligaments on hard ground; because this conformation enjoys a greater freedom from concussion than the more upright shape. Hence, we find in India, where the "going" is very hard, that oblique pasterns are almost indispensable for horses which have to do fast work in that country. With oblique pasterns, the suspensory ligament acts at a certain mechanical disadvantage, which is more than compensated for by the greater freedom from concussion. When the ground is soft and level, the balance is, probably, in favour of the more upright form, which is particularly bad for going down hill; for the weight, then, being thrown forward, jars the ligament at every stride. This is well understood by racing men, who always entertain the greatest prejudice against a horse with upright pasterns, when he is called upon to race down a hill.

In training horses with weak suspensory ligaments or back tendons, the work, if possible, should be given only up an incline.

Obliquity of the pasterns is chiefly obtained by increased length of the pastern bones.

In horses that are used for fast work, sprain of the suspensory ligament is nearly always confined to the fore-legs.

Sprain of the Suspensory Ligament in Cart-horses.—This rather rare accident, with these animals, generally occurs in the hind legs, and is due to extreme extension of the foot, as when going down hill with a heavy weight behind. Cart-horses with oblique pasterns appear to be more liable to this injury, than are those which are differently formed. Here we have the ill effects of a mechanical disadvantage.

Symptoms of Sprain of the Suspensory Ligament.—As I have said before, this accident usually occurs to one or both of the branches of the ligament, a little above the fetlock joint. If the injury be but slight, although there may be heat and swelling of the part, the horse may stand level and walk fairly well; but the lameness at the trot will be disproportionately great to that at the walk. If the case be severe, there will be considerable lameness, the toe only being brought to the ground. When there is rupture of the ligament, the fetlock pad comes down and the toe turns up, owing to the fetlock losing its powerful inelastic brace. If only one branch of the ligament be severed, the descent of the fetlock pad will be less marked than when both are torn. Rupture of the suspensory ligament is the accident which is termed "*a break down.*"

Sprain of the Check Ligament.—This injury is common among cart-horses. It also occurs to saddle-horses, in which case it appears to be invariably the result of a sudden jerk, caused by the animal placing his foot on some inequality of the ground. I have known several instances of it happening to race-horses that were exercised on courses which were cut up by ruts of wheels, etc., crossing them. Sprain of the suspensory ligament, on the contrary, almost always takes place when a horse begins to tire in his gallop. As I have pointed out before, the check ligament, in connection with the portion of the perforans tendon beneath it, serves as an assistant brace to the suspensory ligament, which may become severed, and the fetlock pad may come to the ground, without the check ligament being sprained at all. That the sprain must occur when weight is thrown on the foot is evident; because the moment the foot is flexed, the check ligament is thrown into a state of rest. Again, it rarely happens during the gallop on level ground, at which pace there is extreme extension of the foot at each stride. Hence, it strikes me that the usual manner in which it gets sprained, is by a sudden jerk, at a time when the upper portion of the perforans tendon is relaxed, so that the whole of the shock has to be borne by this ligament alone. In the case of a sound horse walking at ease, or going down hill with a heavy load behind him, the heel first comes to the ground, then the toe; the heel is now raised, and finally the foot quits the ground; but when a horse is moving a weight which taxes his strength considerably—particularly when drawing it up hill—the toe first meets the ground, at which moment the flexor muscles are contracted, the tendons are in a state of tension, and the check ligament is at rest. Then, as the weight is overcome, at each step, the flexor muscles are suddenly relaxed, and the heel is brought down to the ground with a quick jerk, which is communicated to the check ligament, at a time when it is unassisted, in bearing the strain, by the upper portion of the perforans tendon. The more the horse's strength is taxed, the higher will the heel be raised from the ground on the toe first touching it, and the greater the consequent jerk will the check ligament receive. The steeper the hill which the horse faces, the longer space will the heel fall through, before it reaches the ground, and, naturally, the greater will be the strain on the check ligament. If we raise the heel by calkins, or by thick-heeled shoes, we shall thereby shorten the distance through which the heel falls, and shall, consequently, diminish the liability to sprain. Practical experience teaches the advisability of doing this. It also proves that sprains of this ligament are more apt to occur going up hill, in draught, than on level ground; and that they hardly, if ever, happen going down hill, which is a mode of progression that throws particularly severe strain on the suspensory ligaments.

The foregoing remarks on the manner in which this ligament becomes sprained at a walk in heavy draught, would, I submit, lead us to the conclusion that when this accident occurs at a fast pace, it must do so by reason of a jerk caused by the toe coming on the ground, at a moment when the heel is unsupported; for instance, when the horse puts his toe on a stone or small mound of hardened earth.

Sprain of this check ligament constitutes what is commonly called *sprain or clap of the back sinews.*

Symptoms of Sprain of the Check Ligament.—As sprain of this ligament usually occurs at its junction with the perforans tendon, there will be more or less swelling at the upper half of the leg between the knee and fetlock. Soon after the accident occurs, the ligament becomes hot, tender, and swollen, a condition which may be perceived by passing the fingers over the part that lies between the back tendons and the cannon bone, and extends from immediately below the knee to about one-third of the way down towards the fetlock. We may readily determine the seat of the injury, from observing that the back tendons and suspensory ligament are unaffected in the first instance. In a day or two, the back tendons, viewing them sideways, assume a more or less "bowed" appearance, by reason of the exudation invading them. In mild cases of injury to this ligament, the symptoms are heat and fulness of the part just below the knee, and but a trifling degree of lameness.

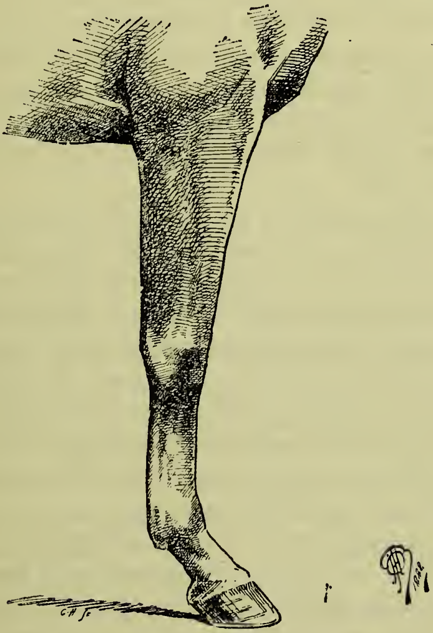
"Frequently, in slight sprains, it is not until the day following that on which the accident happened that any swelling is discoverable." (*Percivall.*) In severe cases, there is marked lameness; and the horse, when standing, rests his toe on the ground in order to throw the injured ligament into a state of rest.

After a bad sprain, we often find a permanent thickening, somewhat in the form of a knot, at the point where the ligament joins the tendon, about three inches below the knee. The existence of such a thickening materially detracts from the value of the animal. At other times, there is a permanent fulness of the ligament just below the knee, and, generally, more on the inner than on the outer side of the leg, without there being any appearance of a knot on the back tendons.

Sprain of the Back Tendons.—The perforans tendon is, as a rule, sprained at the point where it passes over the fetlock. If the injury be severe, the swelling will, generally, extend to the perforatus. There is usually, a great deal of swelling above the fetlock joint, accompanied by heat, pain, and lameness. In the early stages, the seat of the sprain may be detected by feeling the tendons with the fingers.

According to Professor Dick, rupture of some of the fibres of the perforans tendon, at its attachment to the coffin bone, is a frequent cause of navicular disease.

Fig. 2.



This is now, generally, considered to be a result, and not a cause of that complaint.

Sprain of the Sheath of the Back Tendons.—This term is, usually, applied to a swollen condition of the back tendons, from the knee to the fetlock, accompanied by heat. In slight cases, there may be no lameness, only a little thickening all the way down.

This accident is generally brought on by galloping on heavy ground. It seems difficult to imagine how the sheath could be sprained, without the tendons being seriously involved at the same time. I regard the term as an ingenious expression for making light of a very grave accident. There is always present more or less of a "bow," though, sometimes, so slight as to escape notice except by a practised eye. A "bowed" condition of the back tendons, whether resulting from sprain of the check ligament, or from injury to the back tendons is shown in Fig. 2, in which the departure out of the straight line, is only just sufficient to catch the eye.

General Treatment for Sprain of the Suspensory Ligament, Check Ligament, and Back Tendons.—In treating these accidents, the inexperienced horse-owner need not concern himself much, if he be unable to determine the actual seat of the injury, so long as he can find that some one or other of these structures is involved; for their general treatment, when sprained, is the same.

If we can put the part under treatment before swelling has set in, or before it has reached its fullest extent, say, within an hour of the accident, we may place the limb in a bucket of warm water, and quickly raise the temperature to as high as the animal will bear; say, a little lower than the hand can "stand." Two or three minutes of this will suffice; or, we may put the leg in a bucket of cold water and reduce the temperature as much as possible by means of the addition of crushed ice, or snow. I would not advise the employment of refrigerent lotions, as the chemical substances contained in them might have an astringent effect on the skin. The limb might be kept in the cold water for half an hour.

After the application of hot or cold water, as the case may be, or if the swelling has become developed before treatment can be applied, we may envelope the part in a thick layer of cotton wool, and bandage it tightly, so that the pressure, by virtue of the elasticity of the cotton, will be as uniformly distributed on the soft parts which require it, as on the bony prominences which do not need it. There will be but little danger of bandaging too tightly.

I have found the following to be a convenient method for applying this bandage: Take about ½lb. of cotton wool, and a cotton bandage (such as can be got in any chemist's shop) about 3 inches broad and 6 yards long. First of all, wrap loosely round the leg a piece of soft cotton cloth, or put on an ordinary flannel bandage; for the contact of cotton wool sometimes causes irritation to the skin. Place a little cotton wool at each side of the leg at the place where we wish to commence, and loosely wrap the bandage over it—adding, at each turn, more cotton wool, some of which should also be placed at the front of the cannon bone and at the back of the leg—until we get a layer round the part about 4 inches thick. As we proceed, we may gradually tighten the bandage, until at last, we may wrap it round as closely as we can. Finally, we may secure the bandage by sewing, or by tapes.

The cotton-wool bandage should be removed after twenty-four hours; the part carefully hand-rubbed (see page 559); the leg lifted off the ground, and flexed and extended a few times; and a fresh bandage of the same kind put on. The bandage should now be removed morning and evening; and the part hand-rubbed and *passively* worked (see page 10), by taking up the leg and bending the joints without necessitating any muscular effort on the part of the horse.

In my own practice, I apply nothing to a recent sprain —whether it has occurred a month or only a minute ago—except a cotton wool bandage. I mention the employment of hot and cold water, solely and entirely, out of deference to the opinion of other veterinary surgeons. My own idea is that the immense benefits to be derived from the use of a cotton wool bandage, are in no way enhanced by the application of water, either hot or cold.

I am indebted to Dr. Henderson, of Shanghai, for suggesting to me the use, in horse practice, of this cotton wool method of bandaging, which is well and favourably known in the treatment of sprains in men. I believe I have been the first to employ it for sprains in horses. I cannot speak too highly of the marvellously good results I, and many others to whom I have taught it, have obtained with it. I venture to say that it is one of the most useful improvements ever introduced into veterinary surgery.

My friend, Dr. Whitwell, writing to me about the good effects of massage, remarks: "One fact in it interested me very much, namely, the treatment of sprains by gentle massage and *early* exercise. The patient is not allowed to lie up more than a day or so, and the affected tendon is regularly rubbed, gently at first, and the rubbing may be combined with the use of stimulating lotions or embrocations; the object of the treatment being, of course, to prevent the tendon adhering to its sheath, rather than to remove the adhesions when formed." As a stimulating application we might use soap liniment, or a saturated solution of camphor in oil.

The cotton wool should be of the ordinary kind. "Absorbent cotton wool" should not be employed; as it is devoid of elasticity. For the same reason, cotton that has become "caked" from having been used before, should not be employed. It is best to have fresh cotton wool, each time. Instead of cotton wool, we might use other substances, such as tow, sponge, or wool, which possess similar properties.

Although I feel confident that the swelling can be successfully combated by pressure alone; still, if the tension of the skin be great when we take the case first in hand, we may apply, without delay, as large a number of leeches as we can get to stick on to the distended skin; and, after they have dropped off, we may apply the cotton-wool bandage with pressure.

In all cases of descent of the fetlock, caused by severe sprain of the suspensory ligament, I would advise this cotton-wool treatment, which, in this case, should be carried out, so as to give support to the fetlock, by means of the hollow at the back of the pastern being well filled up by tightly packed cotton wool, over which a firm bandage should be placed.

If the horse stands "level," we may take off all four shoes; but if he does not do so, we may apply a high-heeled shoe, or, in urgent cases, put him in slings.

If the high-heeled shoe be used, it should not be kept on longer than about ten days, lest it may give rise to the formation of adhesions. For directions as to physic and laxative food, see page 12.

If a fortnight, or so, of treatment by cotton wool bandaging and hand-rubbing does not produce the desired effect, or if it causes too much trouble to carry it out, we may apply a *charge*, which is an adhesive plaster that may be arranged as follows:—Take 4 ounces, each, of Burgundy pitch and bees'-wax; melt them together; and stir in 2 oz. of mercurial ointment.

Apply the mixture, taking care that it is not so hot as to hurt the skin, to the leg, by means of a stiff painter's brush; so that a thick coating shall cover the back tendons, and fill up the depressions on each side. Place, from time to time, flocks of cotton wool or tow on both sides of the leg, and then cover them with the mixture; until the part presents a round appearance. Over the whole, roll tightly a cotton bandage (about 12 ft. long and 3 in. wide), between the folds of which the mixture is to be freely plastered; so as to obtain uniform and firm pressure. The bandage may be finally secured by sewing. According as it works loose, it may be unrolled, and tightened up afresh, from time to time. It may be kept on for a month; but not longer; for it would then be apt to make the skin sore.

A charge acts by pressure. It may also have a beneficial effect in stimulating the absorbents.

After the charge is taken off, we may apply cold water, as directed on page 13.

As soon as all unusual heat has left the part, we may commence exercising the horse very gradually.

As a last resource, we may fire.

After all, the principal thing is a long and complete rest from work that will throw undue strain on the part; taking care, however, when the structures have, to all appearance, recovered their normal strength, to gradually increase the work, within thoroughly safe limits, until the animal attains his ordinary standard of labour. After a sprain of the check or suspensory ligament which has caused marked lameness, I do not think that a race-horse should be put into strong galloping work, sooner then three months subsequent to the accident. The time need not be so long with trotters; as, at their pace, when one foot comes on the ground, it is always supported by its diagonal fellow; that is, the near fore, by the off hind; and *vice versâ*. It is, here, evident that the trot should be largely used in bringing gallopers who have sprained their fore legs, into full work. Both in the canter and in the gallop, the leading fore, for a short period in every stride, supports the entire weight of the body.

One should avoid giving such horses work which is both fast and long. If it has to be fast, it should be short; if long, it ought to be slow. Half-a-mile or three furlong gallops, repeated a couple of times, with half an hour's rest between, and not oftener than three times a week, will generally be as much as a race-horse, rendered infirm by a sprain, can safely stand. If he shows signs of heat or tenderness after a "spin," it should not be repeated till these symptoms have disappeared. The ground on which such "screws" ought to be worked, should be soft, springy, free from inequalities, and up a gentle incline. Hard, "holding," or slippery ground is particularly unsuitable. If the horse is used for heavy draught, he ought to be shod with calkins; if for light harness or saddle-work, his toes should be kept low and his heels allowed to grow down a little, or he may be shod with thick-heeled shoes, if his heels are naturally weak, so that, in any case, the slope of his fore-feet, to the front, may not be less than 50°; and that of the hind not less than 55°.

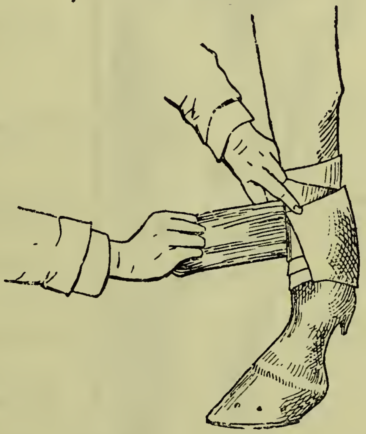
If the leg "fills" after work, the best means of keeping it fine is to handrub it well when the horse returns to his stable, and to apply a cotton wool bandage (see page 27), which should be removed, and the leg again handrubbed before the animal is taken out.

A flannel bandage for stable use should be about

8 ft. long and 4½ in. wide. It should be of thick, close material, similar to that used for cricketing trousers. Serge should not be employed, as its texture is too harsh. Bandages, specially made, with a selvage on each side, can be obtained from any saddler. These are, however, often too short, too thin, and too wide. A bandage to be ready for immediate use should be wound up with the tapes inside. When about to put it on, we may unroll 6 or 8 inches of it, and lay this loose portion obliquely across the outside of the leg, close to the knee, with the end reaching to about the centre of that joint, and the rolled-up part turned to the outside, and directed downwards and forwards. The bandaging should be continued down to, and around the fetlock and upper part of the pastern, and brought close up below the knee. The loose end is then turned down, and the folds of the bandage carried over it. The tapes are tied a little above the centre of the cannon bone. By this method, no twists need be taken in the bandage, which will lie close, and will exert a uniform amount of pressure.

Precautions to be observed when working horses which have suffered from sprain of the tendons or ligaments.—After a sprain, a bandage should be used to afford support for the affected structures. If the animal is required for fast work, as in the case of a hunter or race-horse, some nicety of arrangement is requisite in order to prevent the loose end of the bandage working free. This accident is apt to occur, especially, with an elastic bandage, when the animal is galloping, if it is put on in the ordinary manner. When the bandage thus becomes unrolled, and remains attached to the leg only by the tape, it is liable to trip the horse up. To obviate the chance of this occurring, the following excellent method for securing any kind of bandage might be employed (see Fig. 3). Commence by laying the loose end diagonally across the fetlock with its extremity a little below that joint ; then take about four turns round the leg so that the bandage may come close below the knee, take another turn in a downward direction, bring the loose end up, and lay it flat against the bandaged part, and continue the turns over it. The loose end will now be firmly secured between the cloth on both sides. Or the bandage may be put on according to the method described on page 32, although without bringing it below the fetlock. When put on according to either of these plans, the bandage cannot become undone unless the tape breaks.

Fig. 3.

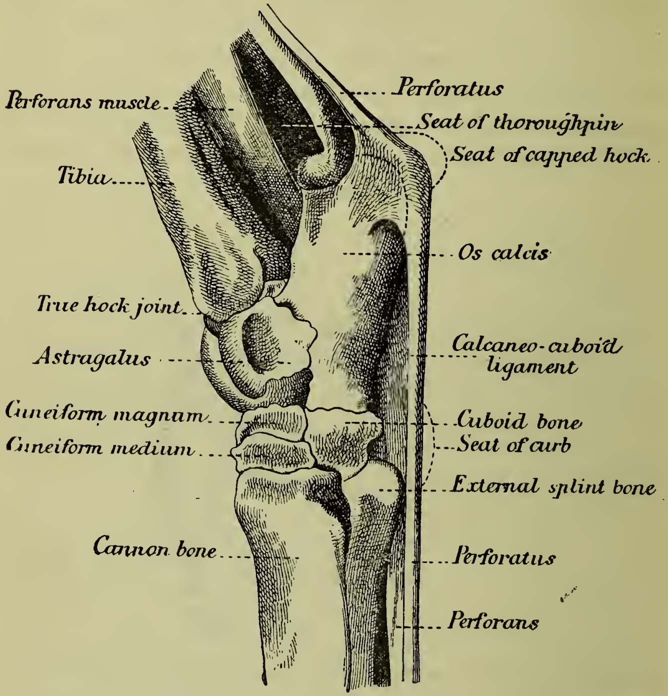


Curb

Is a peculiar sprain of the hock, which causes a swelling to appear to the rear of that joint, and about five inches below its point (see Figs. 4 and 5).

FIG. 4.

OUTSIDE VIEW OF THE NEAR HOCK, WITH SOME OF THE STRUCTURES REMOVED.



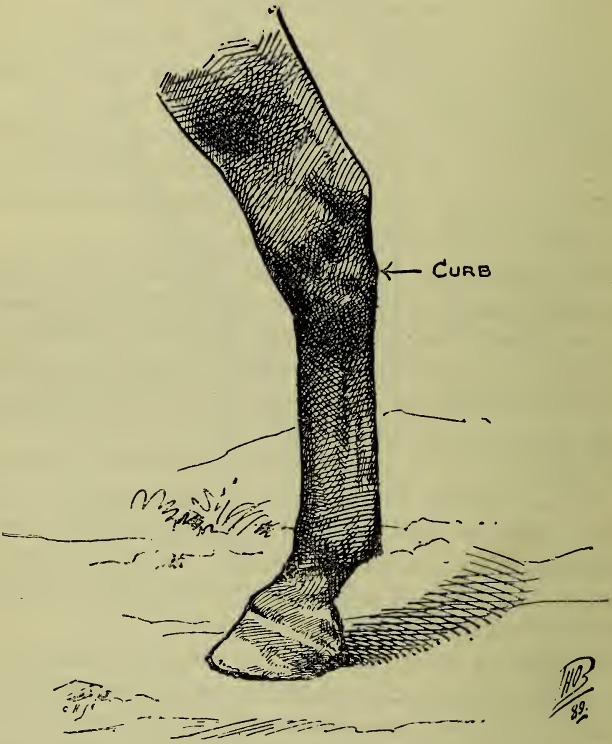
Anatomy and nature of curb.—If we regard the bones of the hock (see Fig. 4), we shall see that the true joint is formed by the tibia and astragalus, which latter bone rests on the cuneiform magnum, while, behind it, is attached the os calcis, which is supported on the cuboid bone. The office of the os calcis is to serve as a pulley for the perforatus, and as a lever for the tendon of the chief extensor muscle of the hock joint. In order to keep the os calcis in its place, there is a powerful ligament (the calcaneo cuboid) attached to its posterior aspect and finally inserted to the back of the cuboid bone and to the head of the external splint bone. The action of this ligament is directly opposed to that of the two before-named muscles, when they are used, for instance, in galloping or leaping. Professor Spooner appears to have been the first to ascribe the cause of curb to sprain of this ligament. I have seen the truth of this theory demonstrated by several dissections, which showed, in cases of curb, marked injury to this ligament. Some authorities consider that curb is due to sprain of adjacent structures.

As pointed out by Professor Williams, this sprain may occur at the point where the ligament is attached to the cuboid bone, in which case the swelling will appear, at the back of the hock, as a small hard nodule, which is sometimes extremely difficult to distinguish from bony prominences that are to be found near the part. Or it may take place where the ligament is, also, inserted to the head of the external splint bone; when it will cause, by reason of the effusion thrown out, the perforatus tendon to bulge out to the rear, in the form of a rounded prominence, at about five inches from the point of the hock.

To detect a curb properly, the observer should view the leg in profile, and should let his eye run from the point of the hock down the back of the joint. If he finds that this line is straight, and, consequently, without a bulge at any part, and that the horse is not lame, he may conclude that the animal is free from curb. A view from both sides should be taken.

When the head of the external splint bone is unusually large, a prominence, somewhat resembling that of curb, may be observed, if an outside view of the hock be taken, though it will not be apparent when the joint is regarded from the other side. The observer may satisfy himself on this point by feeling with the

FIG. 5.



tips of his fingers to ascertain if the course of the perforatus tendon is straight. Unusually large development of the cuboid bone may, also, be mistaken for curb. In this somewhat difficult case on which to decide, the animal's age, style of going, and the form of the other hock, should be carefully considered. As a rule, a horse should not be passed sound if any abnormal conformation is confined to one hock; although, had both been symmetrical, yet slightly differing from the usual shape, little, if any, exception might have been taken.

The term "*sickle hocks,*" is applied to the part when the joint cannot be extended as fully as can usually be done. I may mention that the hock aids the forward propulsion of the body, by means of the lever formed by the os calcis and the portion of the limb below the hock. The ground on which the toe rests is the *fulcrum;* the muscles (those of the gaskin) that are attached to the point of the hock, are the *power;* and the end of the tibia, which rests against the astragalus, is the *weight* to be moved. It is evident that the more nearly the direction of the tibia approaches a position at right angles to that of the lever in question, the greater will be the mechanical advantage at which the power will act; and, consequently, the greater will be the strain on the calcaneo-cuboid ligament, which maintains the os calcis in, more or less, a straight line with the hind cannon bone. As the hock continues extended, as far as it will go, for a brief period, towards the conclusion of the stroke of the hind limb, it follows, that the less it is capable of being extended, the more liable will it be to sprain of the calcaneo-cuboid ligament, in other words, to curb. "Sickle hocks," therefore, are not alone unsightly; but, also, predispose their possessor to curb. A hock with a long os calcis by reason of the greater leverage, would appear to be the form most prone to curb. Practically speaking, if the hock is straight, the os calcis can hardly be too long; for the more leverage is afforded by the bones, the greater will be the mechanical advantage at which the muscles will work.

The term "curby hocks" is an ill-defined expression, which is sometimes used as synonymous with "sickle hocks."

Animals which have suffered from curb, ought not, as a rule, to be used for stud purposes; for the conformation that renders a hock liable to this injury appears to be often transmitted to the offspring.

Men wishing to sell a horse which has a curb, sometimes, try to make out that the swelling is simply the result of a blow; the truth of which assertion may be readily tested by noticing if the swelling is superficial or deep-seated. If it be of the latter nature, we may conclude that it is due to the presence of curb. Horses sometimes knock their hocks near the seat of this sprain when jumping stone walls, etc.

Professor Williams is of opinion that foals are sometimes born with curbs.

In severe curb lameness, the animal, to avoid throwing pressure on the inflamed part, may keep the limb raised.

Treatment.—A high-heeled shoe should be put on, in order to place the part in a state of rest. The rough-and-ready method of applying, in the first instance, a smart biniodide of mercury blister (1 to 8, or 1 to 4, of lard) is probably the best; as, by adopting it, the horse will generally be fit for work as soon as the effect of the blister has subsided. A solution of 30 grains of corrosive sublimate to 1 oz. of spirits of wine is preferred by some to the biniodide of mercury application; but has the disadvantage of being more liable to blemish than the other. In chronic cases, there is nothing so effective as firing, which should be done in horizontal lines, so as to blemish as slightly as possible. The usual plan of fomenting the part, giving a dose of physic, which would be advisable in all cases, and applying a counter irritant when the local heat has disappeared (but not till then), entails far greater loss of time than the other, and is, probably, not as effective.

Sprung Hock.

Anatomy.—Between the bones of the hock there are powerful ligaments (inter-osseous), which serve to bind them together. By a violent strain, these ligaments may become sprained, as well as the annular ligament which passes round the hock, and also the back tendon (the perforans) which passes through the tarsal groove (see Fig. 15, page 150). This very serious accident is called sprung hock.

There is extreme lameness, and great swelling both above and below the inner and back aspect of the hock. "The tendon is bound down at the tarsal groove by the posterior annular ligament, thus preventing the swelling from appearing except above and below." (*Williams.*)

I have seen a few cases of slight sprain of the ligaments of the hock, which were characterized by heat at the front part of the joint, with lameness. They were caused by the horse's foot getting caught in a fence when jumping.

In sprung hock, there is high fever and great pain.

Treatment.—Put the animal into slings; for the injury being in a hind leg, he will not lie down to rest. Give physic. Remove the shoe in order to relieve the limb of its weight. Put on a cotton wool bandage (see page 27); or use warm fomentations, and apply belladonna and glycerine (see page 515). See page 11 *et seq.*

After this accident, the animal should have about eight or nine months' rest. If he get this, he will probably, make a good recovery.

Sprain of the Fetlock Joint.

Anatomy.—About this complex joint we have various parts which are liable to injury; such as the lateral and capsular ligaments, the inferior ligaments of the sesamoid bones, the suspensory ligaments, and the part of the flexor tendon which plays over the sesamoid bones. Injury to these parts causes inflammation of the different sacs of joint oil (synovial bursæ), so that, as a result of sprain, we get a puffed and rounded appearance of the fetlock joint. An intending purchaser should be most careful to note such a condition. The non-professional observer will find it very difficult to determine the seat of injury in a sprain of this complex joint.

Sesamoiditis is inflammation of the synovial bursa which lies between the sesamoid bones and the perforans tendon (see Fig. 1). It may be a result of rheumatism. It causes a sort of hard thoroughpin at the back of the fetlock. Although the swelling will go from one side to the other on pressure, it is hard; because the part admits of little room for distention. This is a most intractable disorder, and is always a serious unsoundness, whether the horse be lame at the time of examination or not; for however sound he may appear to move, he will certainly become lame if put to hard work. Professor Williams points out that wind-galls are soft, and that "this difference in the character of the two enlargements must be remembered, as wind-galls are often found involving this bursa."

"*Knuckling over*," as a result of severe work, appears to be due to relaxation of the capsular and lateral ligaments of the fetlock joint.

Symptoms.—Local pain, heat, and swelling. The animal keeps weight off the heel, and will evince pain if the joint be moved.

Treatment.—Apply a high-heeled shoe, and act according to "General Treatment of Sprains" (page 11). In bad cases, as the inflammation is deep-seated, apply a strong biniodide of mercury blister.

When a fetlock is round and puffy, much good may be derived from cotton-wool bandaging (see page 27).

Sprain of the Inferior Sesamoid Ligaments.

These ligaments, three in number, lie at the back of the pastern, and proceeding from the base of the sesamoid bones, connect them with the pastern bones. Their office is to prevent over-extension of the fetlock joint, and to support the frame during muscular repose, in conjunction with the check ligament and perforans tendon.

Symptoms.—The part is hot, swollen, and tender; and the synovial sac which is at the back of the pastern, and immediately below the fetlock joint, is distended with fluid. The horse endeavours to relieve the injured structures by keeping the fetlock joint bent, and tries to avoid bringing the heel to the ground. There is great lameness.

Treatment.—Put on a high-heeled shoe, and treat as directed under "General Treatment of Sprains" (see page 11). Cotton wool bandaging (see pages 26 and 27) would be advisable. This sprain is generally susceptible of cure if it be properly treated, and a rest of about six weeks be given.

Shoulder Sprain and Shoulder Slip.

Anatomy.—The shoulder joint is formed by the shoulder-blade (see Fig. 20), and the short, thick bone (the *humerus*) which is placed between the shoulder joint (commonly called the point of the shoulder) and the elbow. This ball-and-socket joint being designed to possess great power of extension and flexion, as well as some side-play, is bound down by only one ligament (the capsular), while the tendons of certain muscles pass over it and act as binding ligaments, in preventing it from bulging outwards. When sprain of these muscles occurs, they lose their power of contracting, and hence the head of the humerus is seen to bulge out at each step: a condition which is called "shoulder slip," and is generally found in young horses that have been employed in ploughing at too early an age. The muscles of the shoulder quickly waste, as they are plentifully supplied with blood-vessels, and reveal the position of the spine of the shoulder-blade, which is a bony ridge that stands out at right angles to the outward surface of the shoulder-blade, and divides it into two portions.

"This atrophy is different from that wasting of the shoulders seen in chronic foot lameness. In the one case (that of shoulder slip), the muscles of the external surface of the scapula only are wasted, whilst in the other all the muscles of the shoulder and arm are in that condition" (*Williams*).

There is a large muscle (*flexor brachii*) which takes its origin at the head of the shoulder-blade, passes over the shoulder joint, and is attached to the head of the bone of the fore-arm (the *radius*). Its office is to extend the shoulder joint and raise the fore-arm. When it becomes sprained, the animal, naturally, "drags" his leg—a peculiarity of gait which also occurs when the lameness is due to disease of the shoulder joint.

"The gait of shoulder lameness is indicative of the seat of the disease. The patient does not carry his limb straight forward, but with a rotary motion, the limb being thrown outwards, and the toe made to form the segment of a circle." (*Williams.*)

The animal drags his toe along the ground, and winces with pain when bringing his foot to the front, though not when putting it down. He will show pain when the limb is lifted up and drawn forward. Here, care should be taken that restlessness is not mistaken for soreness. The absence of pain in the knee or elbow may readily be perceived by manipulating those joints. That the ailment which causes the lameness is not located in the foot or lower portion of the leg, may be ascertained from the fact that there is neither heat nor pain present in these parts, and that the animal evinces no special tenderness on putting the foot to the ground.

In shoulder slip, the bulging out of the shoulder joint, when the animal walks, is indicative of the disease. In sprain of the flexor brachii muscle, and in disease of the joint, the drag of the leg is the chief distinguishing symptom.

The flexor brachii, being a hard tendinous muscle, is apt, after being sprained, to become turned, more or less, into bone, and, consequently, to lose its power; hence, the gravity of a sprain of this muscle.

Besides shoulder slip and sprain of the flexor brachii, we may have inflammation of the joint; rheumatism of the muscles; and sprain of the capsular ligament, which is a most serious accident, as it may lead to stiffening of the shoulder joint.

Shoulder slip, when taken in time and properly treated, is an injury which does not materially impair the value of the animal.

The shoulder, though often accused of being so, is rarely the seat of lameness.

Treatment.—The cure of these affections depends entirely upon its being attempted early, before organic change has taken place; the treatment being rest with a high-heeled shoe on, and fomentations, followed by repeated blisters, in order to determine an increased and continued supply of blood to the part for the repair of the injury. After recovery from shoulder slip, the particular kind of work which induced the disease, should, if possible, be discontinued.

Sprains of the Elbow and Hip.

These are rare accidents, which may be distinguished by the fact of the presence of lameness, with local heat, pain, and swelling; while there is absence of the symptoms of disease in other parts. In elbow lameness, "when the horse is made to move, he *drops* considerably, and seems in danger of falling at every step he takes, the limb itself almost bending double when any weight is thrown upon it." (*Williams.*)

The "round bone"—the hip joint—is the favourite spot to which grooms ascribe disease when the horse goes lame behind, the fact being that it is very seldom affected. On the contrary, the hock is the usual seat of lameness in the hind extremity.

Treatment.—The treatment is similar to that recommended for shoulder sprain.

Sprained Back.

The psoæ muscles, which are sprained in this accident, are those that constitute, in the ox, the under cut of the sirloin of beef, and, in the sheep, that of the saddle. Their office is to arch the back, and to flex the hip joint. They become sprained by the horse "slipping up;" by the hind legs getting caught in a fence when "crossing a country;" or, even, by only jumping, when the animal is young and unused to the work. There is more or less paralysis of the hind legs. If the horse is quite unable to support himself behind, even when lifted up on to his feet, we may conclude that he has broken his back, an accident that is not incompatible with his possessing some sensibility in his hind quarters, with the power of moving his tail; always supposing that there has not been displacement of the fractured ends of the broken vertebra.

Treatment.—If the patient can stand moderately well, put him in slings; but if not, then let him lie down and keep an attendant to prevent him from attempting to rise. Give three or four enemas, with intervals of a couple of hours between each, to clear out the intestinal canal, and, it may be, to soothe the inflamed parts. Give a pint of linseed oil as a drench, and proceed as directed under "General Treatment of Sprains." (See page 11.)

CHAPTER II.

SKIN DISEASES.

MANGE—POULTRY LOUSINESS—PARASITIC RINGWORM—SIMPLE ECZEMA —ITCHY TAIL—CRACKED HEELS AND GREASE—MUD FEVER—NON-CONTAGIOUS RINGWORM—SURFEIT—MALLENDERS AND SALLENDERS—BURSATEE—WARTS—HIDEBOUND.

A MINUTE description of skin diseases is not within the scope of this work; nor indeed would it, if given, be of any practical benefit to non-professional readers. The subject is one which requires months, if not years of study, and, even, when mastered theoretically, the student will often find himself at fault in distinguishing between the various varieties, especially when they are of some standing. The broad general treatment is well indicated in most cases; so it will suffice for all practical purposes, if we classify these diseases according to their general manifestations, and not altogether with regard to scientific considerations.

Mange

Is a contagious disease caused by the presence of a small insect, which is somewhat similar to that which produces itch in the human subject.

I am led to believe, from the experience of many careful observers, that true mange—namely, that resulting from the presence of an insect—is a rare disease. The term, however, being a convenient designation, is often indiscriminately applied to any skin eruption which is accompanied by itching and the formation of scabs.

(The following description of these parasites is compiled, principally, from Dr. Fleming's *Veterinary Sanitary Science and Police*.)

These insects feed on the fluid (*serum*) which is contained in blisters. In order to obtain it, they bite the skin, and then inoculate the wound, thus made, with an irritating secretion—similar to that of the mosquito—which causes a small blister to arise.

There are three varieties of these parasites.

The *first variety* (*Dermatodectes* or *Psoroptes*) is the one which is most commonly found in Great Britain. They prick the skin and conceal themselves under and among the scabs, which form when the blisters burst and dry up; but they do not burrow into the skin. If a few scabs be taken off, placed on a sheet of white paper, and exposed to the sun; the insects may be seen moving about by the naked eye, or by the aid of a magnifying glass of small power. They live in colonies; hence, we may observe isolated mangy spots on the skin of the horse infested by them. They chiefly attack the roots of the mane and tail. The itching which their presence causes is more intense than that experienced from either of the other two varieties. When suffering from an attack, not alone the bulbs of the ordinary hair, but also those of the mane and tail become affected, so that the skin becomes bare, wrinkled and bleeding. Owing to their comparatively stationary habits, the disease spreads slowly, and is not quickly communicated from one horse to another, in which respect it differs from the mange caused by the second variety. It is also more readily cured than the latter affection, by reason of the more superficial position of its insects. The bare, scabby skin is kept moist by a continued discharge of fluid from the blisters. This damp condition of the scabs will serve to distinguish it from the second form.

The *second variety* (*Sarcoptes*) of the mange insect burrows in the skin, and is inclined to wander about. The disease usually commences about the mane, and rapidly spreads over the rest of the body, often requiring not more than a week or ten days to do so. On inspecting the skin in the early stage, "a multitude of small hard pimples are found, which feel to the touch as if small seeds had been sown at the roots of the hairs, and had adhered to the skin. Examining one of these points closely, there is discovered a very little scab, to which adhere two or three hairs ; this crust is readily removed with the nail, and leaves a round, denuded, red and tumid surface, about the eighth to the fifth of an inch in diameter. When the crust is detached, there is no longer a prominence except in rare cases." (*Fleming.*) Subsequently, the skin becomes bare of hair, wrinkled, dry, and covered with scabs, which readily break up and powder when rubbed between the fingers. The skin becomes raw and cracked from the horse rubbing himself, and from the dry cuticle wrinkling at those parts which are thrown into folds when the animal moves. This disease is highly contagious, and rapidly spreads among horses which are kept together. The parasites are very similar in appearance and mode of attack to the itch insect of man. If transferred to the human skin, they will live and continue to multiply for a certain time.

In the two forms of this disease which have just been described, the affected animal shows that he is pleased when the mangy spots are scratched with the fingers.

The *third variety* (*Symbiotes*) lives on the skin of the legs, and rarely extends above the knees and hocks. The itching is much less than that caused by the two other kinds. The crusts form into large flakes. Professor Robertson states that they are much more lively during winter than in summer. They are communicated from one animal to another with difficulty.

Treatment.—The horse should be kept in a stall by himself; his clothing should be dipped into boiling water, and his harness, gear, etc., should be rubbed over with oil of turpentine, so as to destroy any of the insects which may have remained on them. The stable fittings, etc., should be washed with soap and hot water, and then lightly brushed over with crude carbolic acid.

As parasites thrive best on or in the animal body, when the vital powers have been lowered by disease, weakness, or by the bad sanitary conditions of the surroundings; we should attend to the horse's general health, so as to render his skin an unsuitable habitat for these parasites. A mild dose of physic—say a pint of linseed oil—may at first be advisable. A linseed mash may, with advantage, be given every, or every second, night; as linseed has an excellent effect on the skin. A drachm of tartar emetic may be mixed through the food daily for a week or ten days. After a few days' interval, an ounce of liquor arsenicalis may be given daily, in the same manner and for a like period. Both tartar emetic and arsenic have a marked beneficial effect on the skin.

As the destruction of the insect is the only radical means for removing the disease, the affected parts should be well washed with warm water and soap, in order to remove the scaly cuticle under which these parasites conceal themselves; and after washing, one of the different mange applications should be rubbed in. In the second variety of mange (sarcoptic), the application should be freely applied over the body, on account of the roaming propensities of the insects I have found nothing more efficacious than plain kerosene (paraffine) oil, applied once a day, and allowed to dry on the horse, if possible, in the sun. Kerosene oil is frequently used in India for this purpose, and has also been recommended by M. Trasbot, Professor at Alfort. It should, however, be used with caution; as it is apt to blister the skin.

The following is a very useful application:—

Common oil	1 pint.
Oil of tar	2 oz.
Sulphur	2 oz.

An excellent application for mange, and indeed for any skin eruption resembling it, especially when accompanied by itching, is—

Corrosive sublimate . . .	½ drachm.
Prussic acid (Scheele's strength) .	2 drachms.
Water	1 pint.

Prussic acid acts beneficially in allaying irritation of the skin.

In cases of doubt as to the nature of the disease, I would advise that this preparation be tried.

If the affected parts be of small extent, mercurial ointment is an excellent dressing. If applied extensively, it is apt to cause salivation.

A mixture of sulphur and train oil forms the common mange ointment.

As the eggs of the mange insect take several days to hatch—fourteen being the usual number stated—we should continue the applications, for the removal of these parasites, sufficiently long to ensure both their destruction and that of their eggs ; those of the sarcoptic variety, during the period of incubation, being hidden in small galleries underneath the skin.

Poultry Lousiness.

The small insects which infest ill-kept poultry are very apt to settle on the horse, if fowls be allowed free entrance into a stable, or if they be kept close to it. These parasites cause intolerable itching of the skin ; but, as they can live for only two or three days away from their natural abode, removal of the poultry will constitute the only treatment actually required. The corrosive sublimate wash, given on page 51, may be tried. On board ship, during long sea voyages, persons are, often, attacked by these insects, if they happen to sit down on a hen-coop.

Parasitic Ringworm (*tinea tonsurans*, and *favus*)

Occurs in, more or less, circular patches. The fungus of the *tinea tonsurans* chiefly attacks the root and body of the hairs, rendering them so brittle that they break off, and give the skin that clipped appearance from which the disease has derived its name. This fungus spreads itself in an irregular manner. The border of the invaded patch of skin presents only to a slight extent the elevated and inflamed condition seen when the disease attacks man. The interior of the patch (within which new diseased spots may break out) may regain to some extent, its original appearance. The skin attacked by this parasite has always a dry and scaly appearance. There is, usually, itching. This form, which is very contagious, can be communicated from the horse to man, and *vice versâ*, as we may see in Eastern countries where the disease is common among the inhabitants.

In India, especially, during the hot weather and rains, many horses suffer from a scaly disease of the skin, to which the terms Prurigo, Psoriasis, Pityriasis, etc., are often applied. It frequently invades the dock of the tail, and the space between the thighs, and may be found on various other parts of the body. It resembles ordinary ringworm, except that it is diffused and has no clearly marked border. Mr. Haslam, A.V.D., who is a clever and experienced microscopist, has proved that this disease is due to a parasite which is either identical to that of ringworm, or is very closely akin to it.

The invasion of the fungus of the *favus* resembles, somewhat, that of the other form of ringworm; except that it gives rise to a more abundant crop of scabs, undermines the skin, and does not render the affected hairs brittle. This disease, which is more rare (except among mice and cats), is also contagious.

Treatment.—All infected clothing, dusters, brushes, gear, woodwork, etc., should be rendered sanitary, either by boiling, or by the application of a strong antiseptic, such as Jeyes' Fluid, or impure carbolic acid, 2 oz., water 1 pint; or they should be removed or destroyed. The floor of the stable should be scraped and dressed with an antiseptic, and the walls whitewashed. The bedding should be destroyed. The skin should be thoroughly well washed with, I may suggest, a mixture of 2 parts of soap to 1 of oil of turpentine, or carbolic soap, Jeyes' soap, tar soap, or ordinary soap. The part should then be dressed with some suitable application, such as Goa powder made up into a thin paste with acetic acid, which Mr. Haslam has found to be the best local treatment. He advises that it should be employed on alternate days, with an ointment of sulphate of copper and soft soap, 1 to 10. Mr. J. E. Elphick, M.R.C.V.S., who has had a good deal of experience of this disease among horses in India and Singapore, recommends a mixture of equal parts of strong mercurial ointment and iodine ointment. I have had good results with oil of turpentine; and with salicylic acid and lard, 1 to 4. If these remedies be not procurable, we might employ paraffin oil, or creosote and lard, 1 to 6. As a rule, the local treatment should be rigorously kept up for at least a fortnight after all appearance of the disease has vanished; so that the germs in the deeper layers of the skin may not escape destruction. Constitutional treatment is of use in this, as in all other skin diseases. Hence we may give ½ drachm of tartar emetic twice a day in the animal's food for a week, and, after that, we may substitute an ounce of liquor arsenicalis for a similar period.

Simple Eczema.

Speaking popularly, we might call this disease non-contagious mange, as it is accompanied by itching, and somewhat resembles true mange in appearance. There are, however, no insects present; and the skin has not the same bare, scabby, and furrowed look which it presents in the contagious form. We may define *eczema* as an inflammation of the skin, which is accompanied by an eruption of pimples that become filled with a watery fluid (*serum*), which may escape or dry up, and leave scabs or scales on the skin. In the event of infection from putrefactive germs, pus, instead of serum, may be formed. Dr. Unna considers that the majority of cases of eczema are of parasitic origin. This is in harmony with Mr. Haslam's conclusions (see page 53). The vesicles may be scattered, or collected into groups of various forms. This disease appears to be brought on by infection; some influence which interferes with the healthy action of the skin, such as checked perspiration; errors in feeding; irritation from the wearing of woollen or dirty clothing; want of grooming; a "heated" state of the system, etc. The root of the tail is often the chief point of attack. The eruptions may extend over any part of the body; the most common spots being the neck, shoulders, flanks, insides of thighs, and root of tail. The scattered form of eczema (*lichen simplex*) is very common during the hot weather and rains in India. The tail and the parts about it are, then, its favourite points of attack. We find a somewhat similar affection, called "prickly heat," among persons residing in the tropics; especially when the climate is a damp one. I may remark that the presence of moisture in the heated air prevents the free evaporation of perspiration from the skin, and also encourages the growth of low forms of life.

The irritating effect of a flannel shirt next the skin during the hot weather in the tropics, makes itself quickly felt by the wearer, if he has a tendency to "prickly heat." In fact, the simple wearing of cotton shirts next the skin will often prevent an attack of this affection, which would be inevitable were flannel shirts worn instead. As the skin of the horse is much more sensitive than our own, it is highly advisable in cases of skin diseases which are accompanied by itching, never to put woollen material next the horse's skin; the wearing of a clean cotton sheet being, here, clearly indicated.

Owing to the similarity of the causes which affect the skins of horses, at the same season, from year to year, we often find non-contagious mange occurring once every twelve months in different animals at the same time, that being almost always summer. If it occurs in winter, it may then be due to irritation caused by dirty woollen clothing, want of grooming, or some constitutional disturbance which has checked perspiration.

Treatment.—Give bran mashes and a dose of physic. Keep the horse on soft food and green meat. But if he be already on grass, substitute hay for it.

"It must also be borne in mind that all rough articles of diet, such as meal seeds, coarse straw, and other inferior and damaged stuffs, are very prone to cause skin diseases." (*Williams.*) Boil a couple of pounds of linseed in a gallon of water for five or six hours, and divide it between the daily feeds; or mix a couple of ounces of linseed oil in the horse's food two or three times a day; and in his corn or mash give a drachm and a half of tartar emetic, daily for a week or ten days. The use of common or rock salt should not be neglected. This treatment will generally suffice for mild cases. In more obstinate attacks, stop, after a week's time, the tartar emetic, and substitute an ounce of liquor arsenicalis; after a few days' intermission, these medicines may be alternated again. If the patient is suffering from indigestion, he should be specially treated for it.

If the horse is obliged to wear woollen clothing, a cotton sheet should be placed between it and the skin. While the ailment lasts, a soft rubber should be substituted for the brush and currycomb.

Dress the irritated surfaces with any of the following.

(1)	Jeyes' Fluid	1 oz.
	Water	1 pint.
(2)	Carbolic acid	1 part.
	Glycerine or oil	40 parts.
(3)	Goulard's extract	1 part.
	Glycerine or oil	4 parts.
(4)	Corrosive sublimate	½ drachm.
	Prussic acid (Scheele's strength)	2 drachms.
	Water	1 pint.
(5)	Citrine ointment (strong)	1 part.
	Lard, or vaseline	3 parts.

No. 5 should not be used over large surfaces, nor often repeated, lest it might salivate the animal.

The horse should be washed with warm water and carbolic or tar soap, well dried, and then dressed with the application.

I may mention that the term *prurigo*, is frequently used to signify any form of eczema (especially that about the root of the tail) which is accompanied by much itching. "It is uncertain whether there is any specific affection to which the name, *prurigo*, is applicable" (Bristowe). The kindred term, *pruritis*, simply means "itching."

Itchy Tail.

The above unscientific term is here used for convenience sake to express an irritated condition of the dock which induces the horse to rub it against any convenient object and thus to disfigure himself. The animal is usually prompted to do this by skin disease—parasitic, or non-parasitic—of the part, or by reflex irritation, such as that due to worms.

Treatment.—In order to protect the part from being rubbed, we may roll round the root of the dock—which is generally the seat of irritation—a cotton bandage, about 4 yards long, and 3 inches broad, which may be kept in its place, if we, from time to time, take up a lock of hair of the tail from below, and turn it upwards, so that at the next turn of the bandage, this reversed lock of hair may come between two thicknesses of cloth. The bandage may be secured by tapes, or by sewing. The presence of the bandage not alone protects the part from injury; but, also, has the effect of inducing the animal to refrain from rubbing it.

If the itching be due to worms, the horse should be treated for them; and, from time to time, a little blue mercurial ointment may be placed on the finger, and rubbed round the inside of the anus.

Before putting on the bandage already described, we may wash the part well with warm water; rub in a plentiful supply of carbolic soft soap, or soft soap in which Jeyes' Fluid, one ounce to the pound, has been mixed; and apply the bandage, which may be removed next day. The part should then be washed with warm water, which will make a good lather with the soap that has been previously put on. This treatment may be continued for a few days. If it does not succeed in effecting a cure, we may try in the same manner, two or three applications of blue mercurial ointment, of dilute citron ointment, or of a solution of corrosive sublimate (see page 57). The constitutional treatment would be similar to that described for simple Eczema, see page 56.

Cracked Heels and Grease (*Eczema of the pastern.*)

Definition.—Cracked heels and grease are terms used to denote an inflamed condition of the skin at the back of the pastern produced by irritation to the part. Mild cases are called "cracked heels;" bad ones, "grease;" while the large warty growths that sometimes accompany grease are termed "grapes." Cracked heels are similar to the chapped condition of the lips and hands which sometimes affects persons in cold weather.

Causes.—Although constitutional causes may predispose to an attack, I do not think they can, of themselves, induce one; for were it so, the inflammation would not be confined within its usual very narrow limits. Professor Möller of Berlin considers there is a close connection between grease and canker, and that one may develop into the other. Even if the disease be purely local, there is no reason why constitutional remedies should not benefit it.

The true skin is covered over by a protecting layer (the *epidermis* or *cuticle*) which is similar in its nature to horn and hair, and which is composed of scales of *epithelium*. The hard corns which come on the hands from rowing and other kinds of work, and which may be cut off without causing any pain, are thickened portions of the epidermis. The rolls of apparent dirt which a shampooer in a Turkish bath removes from the skin of the person upon whom he operates, are, for the most part (according to the degree of cleanliness of the subject), layers of epithelium.

The epidermis being unprovided with nerves and blood-vessels is unable of itself to set up any inflammatory action. Its duty, therefore, is solely to protect the true skin. In order to render it the better capable of performing this work, it is kept, during health, more or less moist with oil which is poured out from the ducts of the oil glands that are imbedded in the true skin. I may mention that those parts of the skin which are subject to much bending and wrinkling, have a more plentiful supply of this oil than other parts which do not need it so much. As the true skin is very sensitive to the action of any external irritant, it follows that causes which tend to weaken the protective action of the epidermis, may give rise to inflammation of the true skin, of which eczema is one form. There seems but little doubt that the ammonia which is to be plentifully found in ill-kept stables, is a fruitful cause of cracked heels and grease. The action of water on the skin renders the epithelium soft and pulpy, and diminishes its cohesion by separating the layers which compose this covering, one from another. When the epithelium dries after having been thus treated, it is liable to crack, and in this manner to still further expose the true skin to irritation from dirt and grit, and from impurities contained in the surrounding air or in the water which may get access to the part. The action of water further weakens the protective influence of the epidermis by dissolving out the oil previously contained in it. We see this well shown by the fact that washing the horse's feet with warm water is much more liable to give cracked heels than washing them with cold water; the former being the better means of the two for removing the oil and for softening the epithelium. Besides, if the water of a country contains much mineral matter (such as salts of lime) which has the tendency to increase the power water possesses to remove oil from the skin, we shall find, that horses in such a country are peculiarly liable to cracked heels. I may add that water containing such mineral matter would, with a weakened epidermis, probably have a directly irritating effect on the true skin.

The moisture and accumulated filth, as well as the ammonia to be found in unsanitary stables, play their part in the production of cracked heels and grease. The dew on the ground and the sweat running down and drying on the pasterns, especially if there be a cold wind blowing at the time, often cause this disease, as we may see in the case of race horses that are worked in the early mornings. Other things being equal, horses who do their work at fast paces, are more likely to get their heels chapped, than are those whose work is slow; for the skin that covers their pasterns is subject to more violent and rapid flexion and extension, and will proportionately suffer from any derangement of the lubricating apparatus, which, here, is the oil glands of the skin. The feeding of horses on unwholesome oats appears to have some influence in the production of cracked heels.

Experience tells us that cold has a well-marked effect in producing this disease. We know from experiment that if blood, after having been expelled from the blood-vessels and kept out of them for some time, be allowed to return to the vessels, it will act as an irritant to their walls, and will set up inflammation. This appears to be the mode in which cold produces inflammation of the skin of the pastern;

for it renders the part bloodless for the time being.

Want of exercise, no doubt, has a strong predisposing influence on this disease; for when the animal is kept in a state of enforced rest, the blood in his feet and lower portion of his legs is liable to, more or less, stagnate, on account of the habit the horse usually has of standing up, and by reason of the absence of valves in the veins of the animal's foot. While this partial congestion exists, the health and vitality of the living structures involved in it, become more or less impaired, the cuticle secreted under such conditions affords less protection to the true skin at the back of the pasterns, than it would otherwise do, and the supply of natural oil to lubricate it becomes proportionately reduced. Want of exercise, especially, when combined with high feeding, will, also, predispose the animal to inflammatory attacks of the skin, as well as of other parts.

Hand-rubbing the pasterns of stabled horses, by stimulating the local circulation, reduces the liability of the part to contract eczema; though it would, probably, be of no benefit to horses kept in the open. It is evident, however, that if the skin of the pasterns has become accustomed to it, and its practice be suddenly discontinued, the skin, before it regains its usual working efficiency, will be more subject to this form of inflammation, than it would be, had such stimulation never been applied.

As the hair at the back of the pasterns forms a protection to the part, its removal often induces cracked heels and grease. I do not think that breed has any influence on the production of these affections. It is probable that old horses, from their lower vitality, are more susceptible to eczema of the pastern than are young ones.

Injury, such as that caused by a heel rope, sometimes gives rise to cracked heels; because it exposes the true skin to influences that are likely to give rise to this complaint.

Varieties and Symptoms.—The simplest form of this disease is (1) when it is characterised only by redness and a little heat and swelling (Erythematous eczema); (2) when vesicles form (Pustular eczema); (3) when there is a discharge of pus from the skin (Vesicular eczema); and (4) when there are warty excrescences on the skin (Warty eczema). These are accompanied by more or less infiltration of the skin. We may roughly class (1) and (2) as cracked heels; (3) as grease; and (4) as grapes.

When inflammation is set up in the part, the secretion of oil is interfered with, and cracks usually occur in the places where the skin becomes wrinkled when the pastern joints are bent. The discharge from the vesicles or pustules has an offensive smell, and exerts an irritating effect on the skin. According to the degree of inflammation, so does the skin become thickened. In the characteristic form of grease, the discharge is somewhat like oil (hence the name) and mats the hairs together. "At the diseased places, the hairs gradually fall out, and those that remain, stick out like bristles, whence have arisen the designations *straub* and *igelfuss* (bristle or hedgehog-foot)" (Möller). In grapes, the *papillæ* of the skin are affected; and warts which may, in extreme cases, be as large as one's fist, appear on the surface. In the early stages of a sharp attack, there is pain and lameness, which usually disappear as the disease becomes chronic. If there be no discharge of fluid, the surface of the part will be covered with horny cells, which will have a mealy appearance. In neglected cases, tumours arise from the cracks, and are due to an excessive growth of cicatricial tissue, which is the material that unites the edges of wounds that heal by granulation, and which gives the white appearance to an old scar. Cracked heels and especially grease have a marked tendency to run a chronic course. The former, if neglected, will readily develop into the latter.

Preventive treatment.—Do not wash the feet. If they be muddy, let the mud dry on, and when it is quite dry, brush it off. If it be imperative to wash, carefully dry after doing so, and rub in a little sweet oil or fat (a little beeswax might be a useful addition to increase the consistency), which may also be applied before leaving the stable.

Principles of treatment.—If acute inflammation be present, reduce it, and then use some stimulating application, of a strength suitable to the case, to set up healthy action in the skin. If there be a discharge, keep the part thoroughly disinfected and as dry as possible. Remove all warts and tumours with the knife or scissors, and treat the wounds antiseptically (see page 169).

Treatment.—If the skin be not broken, apply oxide of zinc ointment; citrine ointment (1 to 3 of lard); Goulard's extract and oil (1 to 4); or 4 parts each of cocoa-nut oil, beeswax, and carbolic acid, and 2 parts of camphor. If the skin be at all broken, the same applications may be employed; but the part should be first washed, so as to disinfect it, with warm water, in which a little oatmeal will be a useful addition. If there be much heat and soreness present, wash as before and apply a carrot or turnip poultice for a day or two, and use one of the applications when the inflammation has subsided and the part has been thoroughly disinfected. Enveloping the part in hot bran (as advised by Dr. Armstrong, who has had a long experience among horses) is very efficient for drying up the discharge. For grease, Gerlach advises creosote and spirit (1 to 6). We might use the ointment recommended by Dr. Hutchinson (see page 68); carbolic acid 1 part, camphor 2½ parts; or Jeyes' Fluid, diluted as required. If grapes be present, carefully disinfect (a good wash is 10 grains of corrosive sublimate, 10 drops of hydrochloric acid, in a pint of water); remove the excrescences with the scissors, or knife; use the corrosive sublimate or other antiseptic lotion; cover over with antiseptic cotton wool and gutta-percha tissue; and apply a bandage, so that the part may heal in the best and quickest possible manner.

Mud Fever (*Eczema of the legs and abdomen*)

Is an ailment similar to cracked heels, being inflammation of the skin of the legs, which sometimes extends to the belly, and is caused by the action of moisture and mud, and particularly by the practice of washing the legs after continued work through wet and dirt, as when hunting. There is, usually, a certain amount of fever present. The limbs become very sore, and the horse has to be thrown by for some time.

Here, as in cracked heels, owing to the presence of inflammation, the oil glands of the skin of the parts affected, fail to pour out the oil which is necessary to keep it in a soft and pliable condition.

The practice of clipping horses' legs is a strong predisposing cause of mud fever, as well as of cracked heels. If, after work through mud and wet—supposing the animal's legs have neither been clipped nor singed—the legs be not washed, but be allowed to dry of their own accord, they will rarely become affected by mud fever. The use of warm water, as I have remarked in the case of cracked heels, even with every precaution, is very liable to cause this affection.

"I strongly recommend the Irish method of clipping, namely, clipping all parts of the body except the legs. The hair that is left on the legs protects them from the irritation of wet and dirt." (*Williams.*)

If the horse's legs have to be washed, use only cold water; do the washing in a stable out of the wind; quickly and thoroughly dry the legs with the rubber and by hand-rubbing; apply some vaseline, or sweet oil; and put on flannel bandages. I would advise that the external use of water should be confined to the animal's muzzle, eyes, dock, and sheath.

Treatment.—Treat as for cracked heels. If there be much fever present, give a mild dose of physic—a pint of linseed oil for choice.

The best preventive measure is to allow the mud and dirt to remain on the legs until they are thoroughly dry—say, till next morning—and, then, brush the dust off. The legs should not be clipped.

Non-Contagious Ringworm (*Herpes*).

This disease is almost identical with eczema, except as regards the form it takes. It breaks out on separate portions of the skin, in more or less rounded blotches. The causes and treatment are the same in both diseases.

Surfeit (*Urticaria* or *Nettle-rash*)

Is an eruption of small irregular lumps which break out, suddenly, as a rule, on the horse's neck, loins, or quarters, the usual cause being acidity of the stomach, or some other disturbance of the animal's digestive organs. As the skin is continuous with the mucous membrane of the intestinal canal, a disturbance of the one structure is readily communicated to the other. These lumps, usually, disappear in less than a week. In some cases, the hair on them scales off, "and, what is very peculiar, the hair never assumes its original colour, but remains white on the seat of the rash, the animal being ever afterwards spotted upon those parts where the rash was situated." (*Williams.*) There is more or less itching of the skin. In the human subject, "the formation of wheals is the special characteristic of urticaria." (*Bristowe.*)

Treatment.—Give a mild dose of physic; and mix one ounce of bicarbonate of soda twice a day in the food for a few days. Keep the horse on laxative food, and give a linseed mash every night. Apply application (4) or (5), as mentioned on page 57. The bicarbonate of soda has a soothing effect on the mucous membrane of the intestines; while the good effect of linseed, in cases of irritation of the skin or mucous membrane, is well marked. In obstinate cases, employ tartar emetic, or liquor arsenicalis as directed on page 56.

Mallenders and Sallenders (*Psoriasis*).

Psoriasis is a non-contagious scaly inflammation of the skin, accompanied by cracks in, and thickening of, the part. In bad cases, the cracks exude serum and blood, which aid in the formation of scabs. When it appears behind the knees, it is termed "Mallenders;" when in front of the hocks, "Sallenders." It also occurs on the neck, just in front of the withers; on the upper surface of the root of the tail; and, more rarely, in other positions; in which cases, the eruption receives no distinctive name. Mallenders and sallenders are not very amenable to treatment. This disease is seldom met with, and occurs only among horses whose stable management has been much neglected.

For *treatment*, the part may be soaked in oil to remove the scales, and, after that, we might use dilute citrine ointment (see page 57). Or, after washing the part, we might rub in for about half an hour Dr. Jonathan Hutchinson's favourite ointment, made as follows: chrysophanic acid, 20 grains; Wright's liquor carbonis deterg., 20 minims; white precipitate (hydr. amm. chlor.), 20 grains; benzoated lard, 2 oz. The part should neither be fomented, nor poulticed. The horse may have linseed mashes or oil, given to him daily, as well as carrots or "green stuff." Beans and kiln-dried or musty oats should be avoided. Two ounces of bicarbonate of soda and an ounce of liquor arsenicalis may be mixed through the food or water daily. A drachm and a half of tartar emetic may be substituted for the arsenic, which should not be continued for longer than a week at a time; as it is liable to accumulate in the system.

Bursatee

Is, as far as I know, peculiar to India.

It appears in the form of unhealthy sores, which break out on the surface of various parts of the body. Mr. Fred Smith is of opinion, after a careful microscopical examination, that the disease is due to a vegetable parasite. This, however, has not been definitely settled. As purely speculative theories are beyond the scope of this work, I will content myself with detailing the principal facts connected with this disease.

Its name implies (*bursat* signifying rain in Persian) that it has some connection with the rainy season.

A horse which has bursatee should be regarded as unsound.

Symptoms.—Bursatee appears in the form of hard chancre-like sores on the skin and mucous membranes of the mouth, eyelids, &c. The fetlock joints (especially), yard, sheath, front of the chest, face, lips, and tongue, are the favourite seats of the disease.

The sores—one or more in number—generally make their appearance towards the end of the hot weather, assume their greatest virulence through the rains, and gradually heal up on the approach of the cold weather; though in old and neglected cases they may continue more or less open all the year round.

Mr. Fred Smith, F.R.C.V.S., states that the disease originates in the tissue immediately under the skin or mucous membrane, in the form of a small hard nodule which is painful to the touch, and is accompanied by heat and swelling, and that, after a few days, the characteristic hard, indolent bursatee ulcer breaks out on the part.

The sore usually takes a somewhat circular form, and may vary from half an inch to nearly a foot in diameter. It bears a strong resemblance to a hard chancre. It has a hard, well-defined margin, hard base, and, at first, a dark-red, unhealthy look. When situated on a part covered with muscle, as on the front of the chest, the sore may assume a yellowish white, suppurating appearance. It is kept moist by the exudation of watery matter. There is but little discharge from the ulcer on to the surrounding skin.

Imbedded in the sore, are found small, hard particles (called *kunkur*) of a yellow or yellowish red appearance, and varying in size from that of a grain of sand, to that of a small pea. They act as foreign bodies in irritating and keeping open the ulcer. They may be easily removed by the aid of a forceps, or by the finger nail.

"When the *kunkur* has once grown, unless it is completely burnt out with caustic, fresh deposits of the same kind are found under the skin all round—perhaps owing to some of the diseased matter being carried from the original centre by the absorbents.

"Many of these deposits being no larger than pins' points, it is very difficult to be sure that all are eradicated; and if any remain they will probably increase in size, and cause the sore to burst out afresh during the next hot season. I have seen pieces of *kunkur* the size of peas picked from the membrane inside the eyelids of colts whose eye fringes, being out of repair, did not keep off flies—an ulcer or sore not having had time to form." (*Mr. Meyrick*, F.R.C.V.S.)

A dried-up bursatee sore, the appearance of which has not been modified by the action of caustics, &c., may be recognised from the fact of its margin and base being hard, its surface being but thinly covered; from its position, and from its peculiar, though difficult to be described, look. It seems ready to break out again at the first unseasonable change in the weather. When it does so, it will probably extend to many times the size it was when dried up.

Post-mortem Appearances.—Mr. Oliphant, F.R.C.V.S., Mr. Meyrick, and other accurate observers, state that *kunkur* is found in the lungs, liver, and other internal organs of the bursatee-affected horse. Further evidence is required to settle the question as to the occurrence of *kunkur* in these organs, independently of the existence of bursatee.

The predisposing causes of bursatee appear to be: irritation due to friction and dirt; neglect in the treatment of wounds; and an irritable condition of the skin brought on by digestive derangement, and by climatic influences.

Liability of certain parts to bursatee.—The special liability of certain parts seems to depend on their comparative exposure to mechanical irritation, and on the thinness of the skin which covers them.

Some facts about bursatee.—Bursatee is practically restricted to "the plains" in India; for though it appears, in a few rare instances, at hill stations, such cases are simply exceptions to the general rule that the disease does not originate, nor does it continue its course, in horses which are kept at elevations of about 5,000 feet or upwards above the level of the sea.

It is most frequently met with in low-lying, and unhealthy localities.

It is practically unknown among horses whose stable management and feeding are properly attended to.

Abrasions which occur during the hot weather, if neglected, are liable to turn into bursatee sores. Clean-cut wounds seldom exhibit this tendency.

Horses that have had this disease, are very liable to its recurrence on the spots which have been previously affected, unless, indeed, the old sores have been completely destroyed by the knife, firing iron, or some strong caustic. An intending purchaser should, therefore, view with suspicion any bald patches indicative of bursatee, which may be visible on its favourite seats.

Formerly, bursatee was very prevalent in Indian stables; but now, owing to improved sanitary arrangements, it is comparatively rare.

According to the Bengal Stud Records, bursatee is not hereditary. Some observers, however, state that the contrary is the case.

I may mention that, during "the rains" in India, owing to the damp heat of the atmosphere, wounds and abrasions heal with extreme difficulty, especially when east winds are prevalent.

The lymphatic glands do not appear to become affected during an attack of bursatee.

If a bursatee sore is destroyed by the hot iron, or by caustics, and then protected from the action of air and water, it will heal as an ordinary wound.

Dr. Branfoot, who has had an extensive experience of horses in India, tells me, that, formerly, bursatee was very common in Madras, at which time, the water for stable use, being procured from local sources, was much contaminated by low forms of life; but that the disease has almost entirely disappeared from that city, since the introduction of a pure water supply from neighbouring hills. I can vouch for the same fact, as regards Calcutta.

I think that the weight of evidence, afforded by the foregoing facts, is in favour of the parasitic origin of this disease.

Microscopical examination of Kunkur.—Dr. Thin, to whom specimens of *kunkur*, in the form of "small, hard, reddish pieces of matter," were submitted, "could make but little of them. When a portion was examined in water, it appeared to be quite amorphous; with acetic acid it looked somewhat like a hardened cell-conglomeration, but the appearances were not sufficiently marked to justify a statement. The masses may be, and probably are, concretions of pus and epidermic cells formed by heat and dryness. No parasites or organisms of any kind could be detected." (*The Veterinary Journal.*) Mr. Fred Smith states that "the nodules are not formed of inspissated pus."

Preventive Measures.—"In some of the late Bengal studs, every wound, even the smallest scratch, was smeared daily with a thick mixture of sulphur and oil upon which no flies will settle.

"I have carried out this practice for many years and have never known a wound so treated to assume a bursatic character." (*Mr. Meyrick.*)

Flies, during the hot weather, being a source of extreme annoyance to horses, as well as being possible carriers of the disease, should be carefully excluded, as much as possible, from the stable by screens, and by keeping the building dark, though without, in any way, impeding the due circulation of air through it. The stalls should be kept scrupulously clean; for the presence of dung and other dirt attracts flies.

During the hot weather in India, the horse should have a plentiful supply of green fodder; his food should consist of, at least, a third of bran; and he should get steady and regular exercise. He should, of course, be thoroughly well groomed at least twice a day.

I am strongly opposed to the practice of washing horses; though I cannot say that it induces bursatee.

Treatment.—The theory as to the parasitic origin of bursatee indicates, and experience proves, that the proper treatment is to destroy the sore, so as to produce a healthy wound; and then to carefully protect the part from the action of air and moisture; from friction or injury of any kind; and from the irritation due to dirt, flies, &c., lodging on it.

Use, in the first instance, undiluted carbolic acid freely to the ulcer, so as to destroy it; and then keep phenicated camphor (see page 517) applied to it.

When the wound assumes a healthy look, substitute the following application:—

Carbolic acid	1 oz.
Resin, or shellac	1 oz.
Camphor	5 oz.
Spirits of Wine	15 oz.

Adopting Dr. Soulez's phenicated camphor as a basis, I have devised the foregoing preparation for sores and abrasions in tropical climates. The resin, on the spirit evaporating, leaves, over the sore, a delicate film which protects it from the injurious action of the atmosphere. The spirit is employed to dilute the acid, and to dissolve the resin and a portion of the camphor. The increased amount of camphor is a most desirable acquisition. The smell of the camphor and carbolic acid will keep off flies.

As alternative treatment, in case the foregoing does not effect a speedy cure, I would advise the application of a saturated solution of iodoform in eucalyptus oil (say, a drachm to the ounce); of powdered iodoform;

or 1 part of iodoform to 4 of burnt alum; or 1 of burnt alum to 2 of finely powdered charcoal.

My friend, Mr. J. Meredith, A.V.D., strongly advises that nothing should be done to the bursatee sore beyond keeping on it a coating of calomel, which should be dusted on to it as required, until the scab dries up. The wound will then, he says, rapidly heal up under the scab. He has, by this treatment, obtained excellent results.

Other practitioners advise the continued application of arsenic to the sore.

The horse might get, with benefit, linseed daily with his food, and an ounce of liquor arsenicalis, which may be given for a week at a time, with like intervals. If the skin be in an irritable state, give 2 oz. of bicarbonate of soda mixed in the food every day. The administration of linseed, arsenic, and bicarbonate of soda has a marked good effect on the condition of the skin.

As bursatee sores heal quickly when the horse is sent up to "the hills," I would advise this to be done in the case of a valuable horse thus affected, and, even, as a preventive measure, when such an animal has suffered from a previous attack.

Strict sanitary conditions and good grooming should be observed.

Warts

Are generally found on the lower part of the belly, on the lips, nostrils and eyelids, and about the sheath and penis of the horse, or udder of the mare.

The appearance and position of the wart will sufficiently indicate the proper means for its removal, whether by caustics; the knife; the scissors; tying them with silk, thread or horsehair; or by the firing iron. The hot iron may be often used, with advantage, after the wart has been cut off. On parts requiring delicate treatment, such as the eyelids or lips, the continued and careful application of acetic acid may be tried; or a saturated solution of washing soda in water, four or five times a day, for a few days.

Hidebound

Is a symptom of ill-health, and is not in itself a disease, in which character it has long been the custom to regard it. The skin is dry and hard, and appears to be drawn tight over the animal's body, so that it is difficult to pinch it up with the fingers anywhere over the ribs. This condition is generally brought on by indigestion, derangement of the liver, or worms. It also accompanies, or even precedes, many serious illnesses.

Treatment.—The only rational line of treatment to adopt, is to endeavour to remove the cause, whatever that may be.

When this condition is induced by debility from the effects of poor living and hard work, the following tonic may be found useful, provided that there is no derangement of the liver; for in that case, the administration of any salt of iron would do harm.

Powdered Cantharides . .	5 grains.
Sulphate of iron . . .	20 grains.

To be given twice a day in the food. The sulphate of iron improves the quality of the blood, and the cantharides has a beneficial action on the skin. If the latter, however, produces an irritating effect on the urinary organs, it should be discontinued. Tartar emetic, as directed on page 56, may, with advantage be substituted.

CHAPTER III.

Diseases and Injuries of the Feet.

THRUSH—CONTRACTED HEELS—CANKER—SANDCRACK—FALSE-QUARTER—SPLIT-HOOF—LAMINITIS OR INFLAMMATION OF THE FEET—CHRONIC LAMINITIS—SEEDY TOE—PUMICED FEET—BRITTLE FEET—INFLAMMATION OF THE CORONARY BAND—DONKEYS' FOOT DISEASE—NAVICULAR DISEASE—HORN TUMOURS—TREAD—PRICKS IN SHOEING—WOUNDS OF THE SOLE AND FROG—CORNS—QUITTOR—FORGING OR CLICKING.

Thrush

Is a diseased condition of the sensitive frog, accompanied by an offensive discharge which issues from a longitudinal fissure in the centre of the thick portion of the frog. I may observe that, in the healthy foot, this "cleft of the frog" is merely a depression in the frog substance, and does not penetrate to the sensitive parts. Thrush may be brought on by the action of moisture, which decomposes the horny covering of the sensitive frog, and thus exposes it to irritation from foreign bodies; or by the absence of that pressure which is essential to its health. Both of these causes may be acting at the same time. In England, where the ground is always more or less wet, the former is the usual one; though the latter is more frequently to blame in the tropics during the hot weather. In India, where the ground is hard, many horses with naturally high heels are very prone to thrush from want of pressure on the frog. Their heels, if not kept to a proper level, are apt to "wire in," and the frog becomes dry and shrivelled up. As the disease advances, fissures, from which a fœtid discharge issues, occur on the side of the frog, close to the heel. The foot acquires a contracted appearance. In the event of a horse under these abnormal conditions falling lame, an ignorant or careless observer is likely to assume the ailment to be navicular disease.

When thrush is caused by wet, the frog becomes soft and pulpy. In all cases, the presence of the disease is accompanied by an offensive and peculiar smell.

The action of pressure on the frog is to cause an increased supply of blood to be drawn to the part for its nutrition. Hence, when the frog is exposed to continued pressure, it becomes strong and well developed; but, if it be deprived of this natural stimulus, it becomes diseased and contracted in size. The skin of our own hands and feet is as dependent on continued pressure for its strength and hardness, as is the frog of the horse.

Thrush is more frequently found in the hind than in the fore feet; (1) because, in badly-managed stables, the dung and urine of the horse are often allowed to accumulate under his hind feet for a considerable time; and (2) because the hind feet being naturally more upright and concave than the fore feet, their frogs are less exposed to pressure.

Thrush is, I think, rarely induced by constitutional causes. To prove such a case, it would be necessary to show that the affected foot had been kept perfectly dry, and that its frog had been subjected to pressure for a considerable time before the attack. As far as I can learn, the only horses which seem liable to thrush, from these causes, are coarse-bred animals which have a tendency to grease or swelled legs.

In the tropics, maggots are sometimes found within the cleft of the frog suffering from thrush : their presence, as might be expected, greatly aggravates the disease.

In neglected cases, the horny covering of the frog may rot off, and the red and bleeding sensitive parts become exposed.

Treatment.—If there be no lameness, keep the feet dry, and avoid "stoppings ;" carefully remove with the *drawing-knife* (the peculiarly-shaped knife used by shoeing smiths) or *searcher* (a fine, small drawing-knife) any diseased or loose portions of horn, in order to prevent dirt or wet accumulating about them. Into all the parts from which either discharge or odour issues, introduce calomel or burnt alum, which may be kept in by means of cotton wool, or tow. A little Stockholm tar applied over this stopping will preserve it from wet. This application may be renewed every, or every second day. Above all things, obtain pressure on the frog, and keep the feet dry.

If the animal be actually lame from thrush, give a dose of physic, and apply poultices for two or three days, in order to lessen the inflammation and to remove any offending matters, before using calomel or burnt alum.

In cases where the frog is dry and shrivelled up from want of pressure, take the shoes off and keep the heels and the wall of the hoof as low as possible, short of making the animal go actually tender, and give exercise daily on dry, soft ground. A month of this treatment, together with the use of burnt alum or calomel, will generally restore the frog to a healthy condition, and to nearly, if not quite, its natural size.

If maggots be present, those within reach should be picked out; and the application of oil of turpentine or a little powdered camphor will remove any that may be left.

If the sensitive frog, which will look red and tender, becomes exposed, it should be treated with powdered burnt alum, and should be protected from dirt and other irritating bodies by cotton wool, or tow. Here, the use of caustics, or strong astringents, is not required.

Severe inflammation and lameness may arise from frost-bite of the sensitive sole of a foot suffering from thrush, which disease causes the removal of the natural covering of the part. This injurious effect of extreme cold on the feet of horses is greatly increased by the use of salt on roads to dissolve away the snow. Here, we may bathe the part with warm water, and then dust iodoform over it; or apply white lotion, alum and water, or burnt alum. A dose of physic may be given.

In obstinate cases, give an ounce of liquor arsenicalis daily in the food for a week or ten days.

Contracted Heels.

We may have this condition from causes which have been described in the preceding article on "Thrush;" from the practice of the animal going on his toe by reason of the existence of pain (as in navicular disease), or infirmity; or from malformation. Regarding the matter from a practical point of view, I would say, as far as my experience goes, that the only cases which we should attribute to deformity, are those in which the coronet, at the back of the foot, is not on the same level on both sides. I have seen, in two or three instances, the coronet over an inch higher up the pastern at one heel than at the other. Although I have not had an opportunity of examining by dissection any such case after death; I feel assured from the appearance of these feet, that one wing of the coffin bone must have been twisted either upwards and inwards, or downwards and inwards, as the case may have been. In the very few instances that have come under my observation, only one side has appeared to be affected. Such a condition will, almost to a certainty, give rise to very obstinate thrush, and will render it difficult to afford the foot a level and properly adjusted "bearing," whether the animal be worked barefoot or in shoes. Although the probability of effecting a radical cure in an aggravated case of this kind would be remote; still we should endeavour to palliate the condition, as much as possible, by keeping the heels very low, so as to get as much frog pressure as we can (see treatment of "Thrush"); attending to the thrush, if present; and letting the animal go barefoot, or using "tips" if the ground be suitable, or employing Charlier shoes, or those, the heels of which, on the foot surface, slope outwards and slightly downwards. If these simple means be not of avail, we may try the effective one of cutting, through the wall of the hoof, a groove from the coronet to the ground surface of the foot, so as to isolate that portion of the wall which is close to the heels, from the remainder of the hoof. The groove should be made as deep as possible without drawing blood, and should be kept filled with bees-wax while the foot is growing down.

The appearance of slight contraction, due to the natural form of the foot being narrow, is compatible with health. So long as the contraction does not co-exist with disease, other than thrush, or with any infirmity that prevents the horse from placing his foot "fair" on the ground, or with malformation; the foot can be restored to a healthy and natural state, in a short time, by the means already described.

Canker.

Professor Williams is of opinion that canker is a constitutional disease located in the feet. MM. Peuch and Toussaint consider, that although its nature is not fully understood, it is probably a form of chronic inflammation of the membrane which secretes the sole and frog, and which covers the coffin bone. In some cases, it appears to be due to the extension of the inflammation of "greasy" heels. I may observe that the membrane in question is continuous with the skin of the pastern. The action of damp and of stable manure appears to be the great predisposing cause of canker, even if it is not the actual exciting one. As cart horses are, usually, kept under far worse sanitary conditions than are better bred animals, and as their feet are weaker and more liable to disease, we find that canker is almost peculiar to them. Owing to improved stable management, it is now a rare disease.

Canker seems to have little or no connection with thrush; and may be seen without the fissured condition of the cleft of the frog, which is characteristic of thrush. As canker is generally found only in neglected feet, it is frequently accompanied by thrush.

Symptoms.—The diseased portion of the membrane which covers the ground surface of the coffin bone, instead of forming sound horn for the sole and frog, as the case may be, secretes a thin, stinking, and nearly colourless discharge; and its surface becomes studded over with pale fungoid growths. The sole becomes gradually undermined on account of the extension of this diseased action, which, generally, though by no means invariably, commences at the frog. The hind feet are more often involved than the fore.

The *treatment* of canker is often unsatisfactory, and is generally tedious. The wall should be lowered; all undermined horn should be removed; a seated shoe (see page 591) may be put on, so as to facilitate the application of remedial agents; the feet should be kept dry; and the stable maintained in a sanitary condition. For a dressing, we may try iodoform, or its ointment; dilute citrine ointment; boracic acid ointment; salicylic ointment and collodion (1 to 2), etc. If one application does no good, try another. With pledgets of tow and cross pieces of hoop iron, pressure, which is essential, may be obtained on the sole and frog. Strict cleanliness should be observed. In this disease, a course of arsenic (commencing, say, with 20 grains a day and increasing it up to 30 grains) for a fortnight or so), may prove beneficial. The application of powerful caustics appears to do no good.

Sandcrack

Is a vertical crack in the wall of the hoof, occurring, in the first instance, close to the coronet.

In the healthy foot, the fibres of the wall are firmly held together by adhesive material, which is apt to become altered in its nature, when its secreting membrane is irritated by concussion or other causes. Authorities are divided in opinion as to whether the coronet, or sensitive laminæ, which cover the external surface of the coffin bone, secrete this binding substance. In considering the nature of sandcrack it is immaterial to us which view is taken. In some cases —generally those of hereditary tendency—the horn is naturally so weak that it would appear liable to split on its being subjected to any violent strain. The horn of the feet of almost all horses that are reared on wet, marshy land is more porous and ready to split than is that of those brought up on dry soil. The pernicious system of using seated shoes (see page 591) and of paring the frog, induces sandcrack by the unnatural manner in which the entire weight of the animal is thrown on the crust of the foot, instead of being distributed, as nature intended it to be, between the wall, the frog, the outer portion of the sole, and the bars; irritation being, consequently, set up in the secreting membrane, from undue concussion. The effects of fast work and hard ground, will aid in inducing the process of perverted secretion. If these influences be kept up for some time, that portion of the hoof, namely, the upper part, which has been secreted under them, will be liable to split, and then to form a sandcrack at any moment, which it will, naturally, do at the point which receives the greatest amount of strain; that being, usually, the inner quarter of the fore, and the toe of the hind foot. It sometimes occurs at the toe of the fore extremity, when the foot is very flat. I have met with cases of sandcrack having been caused by indigestion, on account of the secreting membrane of the hoof participating in the general derangement set up in the digestive organs. In these cases of induced sandcrack, the fissure occurs in a moment; although the process leading up to its development is necessarily a slow one.

The injury first begins by a small fissure close to the coronet, and extends upwards, downwards, and inwards, as the mischief is aggravated by concussion, or by strain. In time, the inflamed underlying tissues protrude through the crack, and get pinched and wounded as it opens and shuts during movement. The animal is now excessively lame, especially, when the toe of the hind foot is the seat of the disease.

MM. Peuch and Toussaint assert that if the injury is at the toe, the crack opens, when the foot is raised from the ground ; and closes, when weight is put on it ; but that these actions are reversed, when it is at the quarter. Their view seems to be borne out by the fact, that the lameness of sandcrack at the toe, is much more serious than when the injury is at the quarter.

Treatment.—As the edges of the fissure cannot reunite, we must look to the growing down of the crack as the only cure. If much pain and lameness be present, the foot should be kept in water or poulticed, for a day or two. If, after this, these symptoms continue, the part should be freely opened out with the searcher, and suitably treated ; for we may rest assured that their persistence, then, indicates the presence of mischief in the interior of the foot. After "bottoming" the crack, "a fungous growth is generally seen filling the fissure ; this is the result of the inflammation, depends upon it, and disappears upon its subsidence. It must not be destroyed by caustics, for the application will add to the irritation." (*Williams.*)

After the inflammation has gone down, or if it has not manifested itself to any marked extent, we may proceed to the direct treatment of the injury. This may be considered under two conditions : (1) When the crack does not extend up to the coronet; (2) when it reaches that part. In the first case, we may cut, with the searcher, a groove about an inch long, across the upper extremity of the fissure and parallel to the coronet, so as to protect the part from the effects of concussion, and to allow the horn to grow down intact. The groove should be made as deep as possible, without injuring the sensitive parts: an accident which would usually be manifested by the appearance of blood. Another, and similar, groove may be made at the lower extremity of the crack, in order to prevent motion between the divided edges, and, also, to stop the fissure from invading the sound horn below. If these means are not sufficient to save the sensitive parts from being pinched between the edges of the crack, we may apply clasps—as will be explained further on—to keep the edges together, and, also, to prevent the lodgment of grit and dirt; or we may open out the crack, with a fine searcher. All the grooves which are made, should be kept constantly filled with some adhesive mixture, such as that mentioned on page 105, or suet and bees-wax, in proportions suitable to the climate. Some greasy application may be used to preserve and increase the cohesion of the fibres of the wall, one with another. The coronet should be stimulated to secrete stronger horn by rubbing into it, every second day or so, cantharides or biniodide of mercury ointment, reduced to a quarter of its ordinary strength by the addition of lard. A bar shoe—heart-shaped if the animal be required to go beyond a walk (see page 595)—may be applied; the sole and wall immediately below the crack being, first, eased off to avoid pressure. The shoe should be moderately stout, so as to lessen the effect of concussion. With sandcrack at the toe of the hind foot, a shoe with side clips, like those used for hunting, may be employed.

When the crack extends to the coronet, or when it goes too close to it to allow a groove being made at the upper extremity of the fissure, I would advise the adoption of the plan strongly recommended to me by my friend Mr. G. A. Banham, F.R.C.V.S., who has practised it, with great success, in a large number of severe and old-standing cases. It has, also, been, for many years, a favourite method, for the treatment of sandcrack, among French veterinary surgeons. It may be performed as follows (see Fig. 6) :—Commencing at the coronet, about half an inch away from the crack, on each side, cut, with the searcher, two grooves, so that they may meet, in the line of the fissure, at an angle of about 80°. The grooves should be cut, as

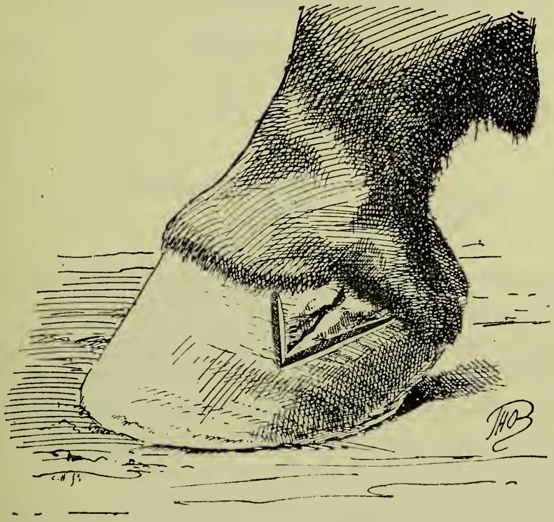


Fig. 6.

before directed, through the hard, outer horn, and partly through the soft, white layer. When the proper depth, throughout, has been reached, the triangular portion of horn which has been left between the two grooves and the coronet, will readily "give" to the pressure of the thumb. The previously detailed precautions as to filling up the grooves, oiling the wall, stimulating the coronet, and shoeing, should, here, be also observed.

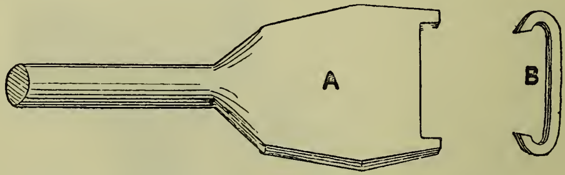


FIG. 7.
(*Half Actual size.*)

The grooves should be made independently of the downward extent of the fissure; for our object is to isolate, from the effects of concussion, that presumably weak portion of the coronet which is immediately above the crack, and which has to secrete new horn to repair the breach; and, also, to prevent motion between the divided edges close to the upper extremity of the fissure.

If the crack extends below the point of meeting of the two grooves, another groove may be cut across its lower end.

The French method of clasping is performed by heating the points of the instrument *A* (see Fig. 7), and then by burning holes in the hoof with them at equal distances from, and at opposite sides of, the crack. The ends of the clasp *B* are now fitted into the holes made by *A*, and the clasp is tightened by a powerful pincers, made for the purpose, in order to bring the edges of the fissure closely together. This is an easy operation. M. Vachette (*Recueil de médecine vétérinaire*) advises that the holes should be made very narrow, so that the points of the clasps will have to be forced into them; that the horn should be allowed to cool down completely before the clasps are put in; that it is advisable to use as many clasps as there is room for them, the clasps being placed about $\frac{2}{5}$ths of an inch apart; that the clasps should not be covered with any greasy material, which might cause their hold to become loosened; that it is well to wet them with vinegar or with an acid, so as to facilitate their oxidation, and, thus, to increase their adhesion to the horn; that the clasps should be protected by a leather strap; and that, as soon as the hoof grows sufficiently down, say, in three or four weeks, a fresh clasp should be placed above the topmost one. A second method of clasping, but one requiring the aid of a skilful smith, is to cut a small groove, about a quarter of an inch deep, at each side of, and parallel to the crack, each groove being about half an inch away from it. A small, broad horse-nail, with its point hammered flat, is now driven so as to enter at one

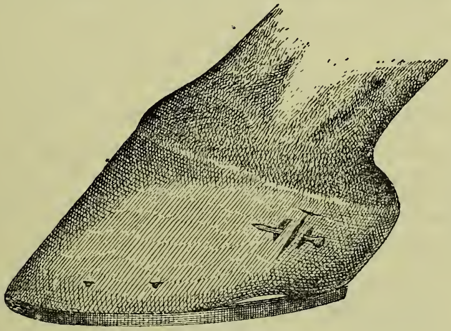


FIG. 8.

groove and to come out at the other (see Fig. 8). The edges of the crack are brought together with the pincers; the head of the nail is cut off, and both ends are clenched. A third method, which can easily be done at the toe, consists in drilling a hole through the horn, and, then, using a round nail in a manner similar to the way just described. If the assistance of a good smith be procurable, the former is the better plan, though the latter is the safer of the two.

I may observe that a sandcrack will take from eight to twelve months to grow down.

After the cure is effected, use shoes that are perfectly flat on the foot surface; avoid "thinning" the sole, or, even, touching it with the knife; and obtain frog pressure, which may be done by keeping the hoof short, taking care not to interfere with the proper slope of the foot, and by using tolerably thin shoes. The coronet may be stimulated from time to time, by cantharides or biniodide of mercury ointment of a quarter of its usual strength.

Cases of sandcrack caused by indigestion, should be treated, generally, for indigestion; and, locally, for sandcrack.

False Quarter

Is a longitudinal depression in the wall of the hoof, due to non-secretion of the horny crust by the coronet. This loss of secreting power is caused by an injury—such as tread or quittor—which destroys the part. The horn covering this depression appears to be derived, principally, from the sensitive laminæ. False quarter may commence at any part of the coronet but is most common at that from which it takes its name.

To guard against tricks played with sandcracks and false quarters, it is advisable, before buying a horse, to have his feet washed.

Treatment can only be palliative. Here, as directed for sandcrack, the effect of a blister on the coronet may be tried.

Split Hoof.

Under the above heading I wish to include those divisions of the horn of the foot which do not take the characteristic form of "sandcrack."

The chief varieties of this accident are as follow:—

1. A split of the hoof, which, as the result of concussion on hard ground, commences on the ground surface of the foot at the bottom of the groove that separates the heel, at either side, from the frog, and extends through the horn, more or less up to the coronet at the back of the pastern.

Treatment.—If there be lameness, poultice the foot for a couple of days; open out the fissure freely with a fine drawing knife or searcher; lower the heels so as to take pressure off them; apply a heart-shaped bar shoe (see page 595), which will throw weight on the frog; and rub a little blistering ointment (cantharides 1 to 24, or biniodide of mercury 1 to 32, of lard) into that part of the coronet which is immediately above the crack, every second day or so, in order to stimulate it to secrete strong horn.

The opening-out of the fissure is done to prevent the sensitive parts underneath from becoming pinched, when the horse places his foot on the ground.

2. The wall of the hoof sometimes splits at its lower extremity, thus forming a sort of spurious sandcrack. In these cases, the fissure rarely extends higher up than a couple of inches.

Treat as for sandcrack.

3. A horizontal division of the horn, which, generally, commencing a little above the heels, extends in a forward and slightly upward direction. Beyond carefully cutting it out, it will not require any special treatment.

4. The horn at the coronet sometimes separates horizontally for a little distance, and forms a cavity in which water and dust may lodge. Every part of the detached horn should be cut away with the drawing-knife, and the coronet above the fissure should be blistered as before described.

Laminitis, or Inflammation of the Feet.

We may regard laminitis under two forms, namely, acute and chronic; and may look upon the sub-acute form as an intermediate stage between the other two.

Professor Williams divides laminitis into two kinds: first, when the inflammation is confined to the soft structures of the foot; second, when the inflammation also involves the coffin bone from the outset. The former is generally due to derangements of the digestive organs; the latter, to concussion.

"Attentive observation of facts demonstrates that laminitis attacks equally all horses, whatever may be the shape of their hoofs." (*Peuch and Toussaint.*)

The *sensitive laminæ* are continuations of the true skin, and cover the outer surface of the coffin bone (see Fig. 11), at the lower margin of which they terminate, while they take their origin at the coronary band, which secretes the wall of the hoof. These laminæ consist of from five to six hundred folds, which dovetail into the horny laminæ of the wall. Some authorities, as before mentioned, maintain that the wall and its laminæ are entirely secreted by the coronet, and that the sensitive laminæ, during health, are occupied only in secreting soft cells which bind the sensitive and horny laminæ together; although, under the influence of inflammation, or if the wall is removed, the sensitive laminæ have the power of secreting soft and non-fibrous horn, as in "false quarter." Other authorities consider that the sensitive laminæ secrete both the outer horn and the soft inner horn of the wall. It matters little, as regards the correct treatment of this disease, which view we adopt.

Causes.—Acute laminitis is due either to mechanical strain, or to inflammation extending from the mucous membrane or skin to the laminæ, all these structures being continuous with one another. In the latter case, the usual exciting causes are: superpurgation; irritation to the stomach or intestines from unsuitable food; and inflammation of the lungs. Idleness and rich food are strong predisposing causes; for they increase the weight the feet have got to bear, and induce stagnation of blood in them by increasing the amount of the solid constituents contained in that fluid. The fact of frequent cases of laminitis occurring among horses that are kept standing for many days on board ship, proves the evil effect of want of exercise in inducing this disease. To lessen this danger, under these conditions, the shoes should be removed, the heels and walls of the hoof should be rasped down, to get both frog and sole pressure, and the animal should have some soft substance, such as coir matting, to stand on.

Mr. Broad states, "I have known it to occur to fat horses which have been at grass for months without having been haltered."

Long and fast work on hard roads, especially after a period of idleness, is very apt to bring on this disease.

Acute laminitis induced by direct strain on the parts, is much more intractable than the other form; and its development is greatly favoured by the pernicious system of using seated shoes, which relieves the sole from pressure and throws almost all the work on the wall of the hoof (see page 591). Besides this, if the frog is also deprived of pressure, the jar on the sensitive laminæ will be greatly increased. The strain is further augmented by the hoof being kept in an unnaturally upright position by means of thick-heeled shoes, calkins, or by allowing the heels to grow too long, while the toes are kept low.

Feeding horses on wheat, and, also, exclusively on maize, has a marked tendency to produce laminitis. Barley, too, is said to produce this disease, which must be when it is given raw and by itself; for it does not exhibit this property when used in a boiled state, when broken and mixed with other grain, or in the Eastern method (see page 501).

As the fore-feet are far more exposed to the effects of concussion than the hind, we generally find that they alone are implicated in an attack of laminitis.

"It is not very unusual to find all the four feet affected, sometimes the two hind feet only, and in rare instances one fore or one hind foot." (*Williams.*)

Founder is the old name by which this disease was known, and is still used by grooms.

Symptoms of Acute Laminitis.—The horse will endeavour to relieve the walls of the affected hoofs of pressure by, if the malady be in the fore-feet, stretching them forward so as to throw weight on the heels, and by bringing the hind feet, as much as possible, under the centre of gravity of the body. But, if the disease be confined to the hind feet, the animal will draw back his fore-feet under his body, and will advance the hind ones, so as to relieve the toes of the latter of pressure; while the head and neck will be bent down, so as to act as a counterpoise to the hind quarters. The horse evinces uneasiness in the affected feet. Generally, there is considerable heat present in the hoofs and coronets, and the arteries which run down the pasterns, throb.

Tapping the foot lightly with a hammer causes pain. The horse objects strongly to any foot being taken up, if, by doing so, weight be thrown on an affected leg; he suffers great distress, especially when the hind feet are attacked, which is, probably, owing to the rigid connection of the hind limbs to the body hindering adjustment of pressure by the feet; he is most unwilling to move; and, at first, is, generally, very averse from lying down. The breathing is hurried, and the lining membrane of the eyelids (the conjuctiva) is more or less red from congestion. "To diagnose a case quickly, the best method is to push the animal backwards, when it will be seen at once that he will elevate his toes and throw his weight upon the heels. The pulse of laminitis is full, strong, and accelerated; and it will maintain the character of strength and fulness even after general debility has manifested itself." (*Williams.*) The pulse is full and hard, and differs in this respect from that in all other diseases, in which, if the pulse be hard, it is also small. This pulse serves to distinguish laminitis from pneumonia. Laminitis may be mistaken for disease of the kidneys, or for azoturia. In a first attack, the animal is generally afraid to lie down, but, in subsequent ones, he usually appears only too glad to get off his feet.

Consequences of Acute Laminitis.—The attack may pass off without any injurious effect, or more or less serious changes may result. After a severe attack, the point of the coffin bone may drop, and may even protrude through the sole. This is, sometimes, owing, as explained by MM. Peuch and Toussaint, to the sensitive laminæ, the horn-secreting functions of which are to some degree latent in health, becoming greatly stimulated, and producing a quantity of new horn, which, being continually secreted, exercises enormous pressure between the wall and coffin bone, and, finally, forces the point of the latter down and causes the former to become more or less flat. In this case, the toe becomes greatly thickened by this new growth of horn. At other times, hemorrhage (bleeding) takes place inside the hoof, or an exudation may be formed within it, and may, also, cause displacement of the point of the coffin bone, though without the increased formation of horn. Hence, when these fluids are removed, a cavity will be found between the wall and the coffin bone, and partly filled up by the dried remains of the blood or exudation. We have here the condition known as "seedy toe." In it, the sensitive laminæ do not produce an excessive quantity of horn as they do in the other case. When the inflammation is very intense, the amount of exudation or suppuration.

whichever is present, may be so great as to force away the hoof, at the coronet, from its secreting membrane, and thus to cause the hoof to be shed. If the animal survives this terribly severe accident, the old hoof will be replaced, in time, by another of weaker and more imperfect horn. In the event of recovery after the point of the coffin bone has come through the sole, the protruding part will, if allowed to do so, drop off, and the remainder of that portion of bone which has been brought close to the sole, will become more or less absorbed. When displacement of the coffin bone takes place, the sole becomes thin and weak. I need hardly say that the result of such complications will be to very seriously diminish the animal's usefulness.

Treatment.—Bleed from the coronet at three or four points, by puncturing it obliquely with a lancet or penknife: one or two quarts of blood may safely be removed. Keep up a laxative condition of the bowels by putting the animal on soft food, and by giving, if necessary, a pint of linseed oil, and assist the effect with an enema or two of a gallon of warm water. Allow the horse plenty of water to drink. A strong purgative, especially aloes, should, however, not be given; for we should avoid irritating the mucous membrane of the intestines, with which the secreting membrane of the foot is in close sympathy. If diarrhœa be present, give neither a purgative nor an astringent. Remove the shoes and rasp the wall level with the sole, so as to allow the latter structure and the frog to bear weight; but on no account pare the sole. Mix two ounces of the bicarbonate of soda twice a day in the food.

If practicable, it is generally advisable, after the bleeding, to walk the animal about a little. Encourage the bleeding and the relaxation of the parts by standing the feet in warm water. Allow the horse to lie down as much as possible. If he will not do so of his own accord, throw him gently. The advisability of doing this is shewn by the pulse, after the horse is down, always falling in a marked manner. We may keep the feet in poultices for a few days. After some days, when convalescence sets in, use Mr. Broad's shoes, which are "extremely stout, wide-webbed, and long bar shoes, made from iron about twice the ordinary thickness of those of the particular animal under treatment; make them gradually thin from behind the quarter, so that the heel part of the shoes may be as wide and thin as possible, and fitted rocker fashion to allow the weight of the horse to be on that part; put them on with leather soles, using only sufficient nails to ensure their staying on." (*Mr. Broad.*)

French veterinary surgeons advise that, after the horse has been made to lie down, the foot should be lowered, and the sole pared thin, so as to allow of expansion; and, in the event of an accumulation of blood, exudation, or pus being suspected within the foot, that an excavation for its liberation should be made at the toe, somewhat similar to that for a prick in shoeing. The ordinary English practice is opposed to thinning the sole.

If constipation or collicky pains be present, give a drachm of extract of belladonna, or 40 drops of liquor atropiæ sulphatis subcutaneously (see page 574), and linseed oil. Bicarbonate of soda should also be given.

A short, slow walk, say, of a hundred yards at a time, should be enforced in cases which arise from idleness and continued standing, as may happen on board ship. I may, however, remark that after landing horses from a sea voyage, it is advisable to keep them for a few days in loose boxes; so that they may recover the use of their feet, before they are, very gradually, brought on to work. A walk, even of a few miles, immediately after coming off ship is apt to set up laminitis; although, previously, no symptoms of that disease might have been apparent.

When the hind feet are affected, the horse is often prevented from staling, by the pain the act of stretching himself out, would cause him. In these cases the urine should be drawn off by the catheter, three or four times a day.

After an attack has passed away, employ rocker shoes, and blister the coronet.

Chronic Laminitis.

"Chronic laminitis is that condition of the feet remaining after the subsidence of the febrile symptoms, or it may originate independently of an acute attack. Horses suffering from the chronic form are, however, subject to the acute from the most trivial causes; and the acute form, when caused by concussion, if the animal outlives the primary attack, commonly degenerates into the chronic." (*Williams.*)

"Acute laminitis is not very often met with, because horsemen are aware of the risks they run, and take their measures accordingly; but the chronic form is common enough, and hundreds of horses are more or less lame from this cause." (*Stonehenge.*)

The horse owner's attention may well be directed to this not uncommon disease; as it is both serious in its nature and insidious in its approach.

In cases of chronic laminitis, the horse goes short, throws the weight on the heels and, consequently, walks with a more or less straight knee, in a sort of a "fair heel and toe" manner; the action being very different from that due to navicular disease which causes the horse to "dig his toes into the ground," and thus to wear away his shoes in front. A horse suffering from laminitis of the fore limbs, will, when in movement, unduly advance them, so as to throw the weight on the heels, which an animal with navicular disease will avoid as much as possible, and will consequently adopt the opposite style of progression. There will, usually, be some heat present in the affected foot or feet, especially after work. The peculiar position assumed by the horse when standing in the stable, trying as he does to throw the weight on the heels, is generally characteristic. There is more or less alteration in the shape of the feet, which usually become flatter, and their soles less concave than what is usual. Feet thus affected are, as a rule, distinguished by rings of horn which run irregularly, but close together, round the foot. The rings of a healthy hoof, as remarked by Professor Williams are regular, and have wider interspaces than have those of feet which suffer from the disease in question. Sometimes, horse dealers rasp the rings brought on by this ailment, neatly away. These rings are caused by the difference in activity, at particular times, of the cells which secrete horn. When the presence of inflammation interferes with their blood supply, they, naturally, secrete a comparatively small amount of horn, which, on the hoof growing down, appears below the level of the sound horn previously formed. When the cells return, more or less, to a condition of health, they commence to secrete stronger horn, which will show as a raised ring, if followed by another attack of the disease; and so on. We must, here, take into account the fact, that in the first stage of an inflammation, the supply of blood is increased. It is easy to understand that the growth of these rings will, usually, take place in an irregular manner. I may mention, that the normal rings of horn are caused by the fact that there is a periodical fluctuation in the activity of these cells, which occurs at the same time as that of the cells which secrete the coat. Thus, in the ordinary course of events, when a horse sheds his hair, the growth of horn is languid; when he assumes his winter's coat, it is vigorous.

A horse suffering from chronic laminitis does not work sounder when he "warms up," as he does when affected by navicular disease. Seedy-toe often accompanies chronic laminitis.

Treatment.—In chronic laminitis, or in cases having a tendency to it, the sole and frog should be allowed to remain untouched by the drawing-knife, but the wall should be kept well rasped down; care being taken that the shoe does not press on any sensitive part of the sole, which is, usually, in an unusually thin condition. Leather, placed between the wall and the shoe, by diminishing the effect of concussion, is often of service, though its presence will somewhat affect the hold of the nails. Pressure on the frog, which is the natural buffer of the foot, is most essential. In bad cases, Mr. Broad's shoes (see page 98) may be used; but if the animal be but little affected, a heart-shaped bar shoe (see page 595) will be sufficient. The heels, also, may be somewhat lowered; for although this will throw an increased strain on the suspensory ligaments and back tendons, it will materially lessen the jar on the sensitive laminæ—the lesser of the two evils. I have seen several cases of to cart horses which, from chronic laminitis, were unable walk in ordinary shoes without great lameness, do their work with apparent soundness of gait, in Mr. Broad's

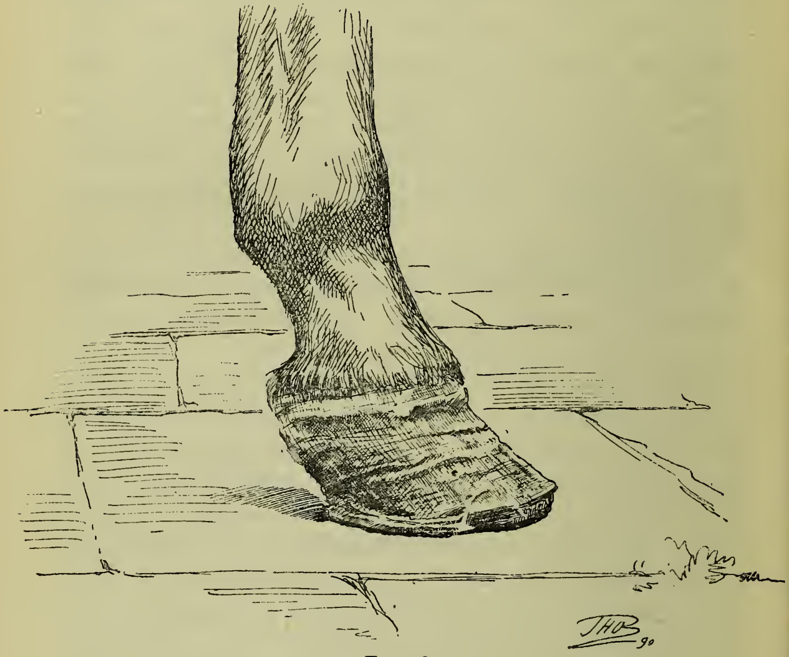


FIG. 9.

shoes. A little cantharides ointment, reduced to a quarter strength, may be rubbed into the coronet every second day or so, in order to stimulate it to secrete stronger horn. After work, if there be any heat present, the horse should be made to stand with his affected feet in warm water for some time. In the stable, tan will make a cool bedding for him to stand on. If that be not procurable, he should have plenty of straw placed under him, and have the stall darkened, so as to induce him to lie down as much as possible. Above all things, he should not be worked on hard ground, nor with a heavy weight on his back. Charlier shoes might be used in some cases, provided the wall of the hoof be strong.

Appearance of a foot which has suffered from laminitis.—It will usually have a largely developed frog; low heels; thin and flat or even convex sole; weak, brittle horn; hoof, generally, flatter than usual; profile of wall often concave instead of straight; frequently, there are rings on the external horn, which run irregularly around it, and meet close together in front; and "seedy-toe" is often present. An unusually large frog, flat sole, and a brittle condition of the horn are very characteristic signs. Fig. 9 shows a foot which has suffered from laminitis.

Seedy-Toe

Is the term applied to a cavity formed within the wall of the hoof and extending from the ground surface up towards the coronet. It is, usually, best marked at the toe, but may also extend round the quarters.

Causes.—It may be due (1) to laminitis (see page 96); (2) to causes, apparently, unconnected with that disease.

In cases coming under the second heading, very little displacement of the coffin bone seems to take place, and, generally, there is no suspicion of the existence of the cavity, until it is discovered by the shoeing smith. The cavity is partly filled with a soft, dry, cheesy material, which crumbles away on being rubbed between the fingers. As it will, except when caused by laminitis, readily grow down if all the apparently diseased horn be removed, and as it will not do so unless this be done, it seems most reasonable to suppose that the disease in question is due to some parasite, as suggested by Professor Axe, who has found, in several instances, numbers of minute boring worms infesting the broken up horn within the cavity. These worms are about the one-thirtieth of an inch in length. This form of seedy-toe hardly ever causes lameness, unless it is very extensive. Until further investigations have been made, it would be premature to accept the theory of the parasitic origin of this disease; for these worms may, after all, be only accidental visitors, as maintained by Mr. Broad of Bath.

It is quite possible that seedy-toe may be brought on by long-continued strain on the feet which was not sufficient to produce actual laminitis, although it might have given rise to perverted secretion by the sensitive laminæ, so that separation occurred between these structures and the wall, on account of their connecting material having lost its adhesive character. I have thought that, in two or three well-marked cases which I have observed, the disease was due to the habit the animals had acquired of never lying down. Mr. Percivall was of opinion that the pressure of the clip of the shoe was the chief cause of this ailment.

The existence of seedy-toe is readily seen on removing the shoes. Sometimes, the wall at the centre of the toe cracks, making a vertical fissure; and there is frequently a depression a little below the centre of the front part of the hoof, when viewed in profile. If the part of the wall which covers the cavity, be tapped, it will emit a hollow sound.

Treatment.—Carefully remove with the searcher every particle of detached horn, until all appearance of a crack in the horn is gone. Apply a bar shoe. Rub into the coronet, every second day or so, a little of the cantharides blistering ointment, reduced to a quarter of its strength by the addition of lard, in order to stimulate the part to secrete sound and strong horn. Apply on the newly exposed surface, a light dressing of carbolic acid, and, then, keep it covered over with some of the following ointment to protect it from moisture:—

Lard or suet	1 lb.
Venice turpentine . . .	1 ,,
Bees-wax	¼ ,,

As the wall grows down, look out for the appearance of any fissure in the horn; if such be perceived, carefully pare it out. Keep the feet dry. A cure is almost certain, unless the cause is laminitis, in which case, it will be more or less doubtful.

If a horse is lame from chronic laminitis and has at the same time seedy-toe, it is useless to treat the latter complaint only, with the view of making him sound.

Pumiced Feet

Is a term by which we designate a flat or convex condition of the sole, which is, generally, due to the descent of the coffin bone, as a result of laminitis—see remarks on that disease—and sometimes to the effects of work on hard ground when seated shoes (see page 591) are used, without any symptoms of laminitis having been apparent.

The unnatural pressure of the coffin bone interferes with the secretion of the horny sole, which accordingly becomes weak and thin.

Treatment.—In order to support the sole and to stimulate the sensitive parts of the foot to healthy action, gradually accustom it to the use of a flat, broad shoe, which at first may be thin at the heels, but as the foot becomes strong, use one of uniform thickness, keeping frog pressure in view. Apply to the coronet blistering ointment in the manner recommended for "seedy-toe," and avoid work on hard ground.

Brittle Feet.

Use broad, flat shoes, which will reduce the jar on the crust by throwing pressure on the sole; and obtain frog pressure. The shoes should be fitted on hot; as by doing so they remain firmer, owing to the more exact juxtaposition of the horn and iron. Clips should be used to save the nails from being shaken; and, for the same reason, calkins should be discarded. Rather fine nails should be employed, as coarse ones are apt to chip away the crust. As recommended, many years ago, by the late Mr. W. Thacker, V.S., the nail holes should be punched well away from the outer edge of the shoe, so that the nails may take a good hold without having to be driven high up, which would be apt to start a chip off the crust. Keep the feet dry. Stimulate the coronet as advised for "seedy-toe."

An excellent method of preventing the clinches of the nails from chipping away the horn immediately below them, is, as has been suggested by Mr. T. Fraser, of Tirhoot, to use an iron washer placed on the end of the nail after it is "driven," and before the clinch is turned down. This washer is cut out of thin sheet iron; is circular in shape; and is about one third of an inch in diameter. There is a slit cut through its centre to fit the end of the nail. When the nail has been driven, the washer is fitted on the point, and is lightly hammered down by means of the buffer, or chisel, until it rests firmly against the hoof. The clinch of the nail is now turned down and is cut off just below the lower edge of the washer. In this manner, the horn is in no way weakened by having a groove in which the end of the clinch is to rest, filed in it. Besides this, if any strain falls on the nail, it will be

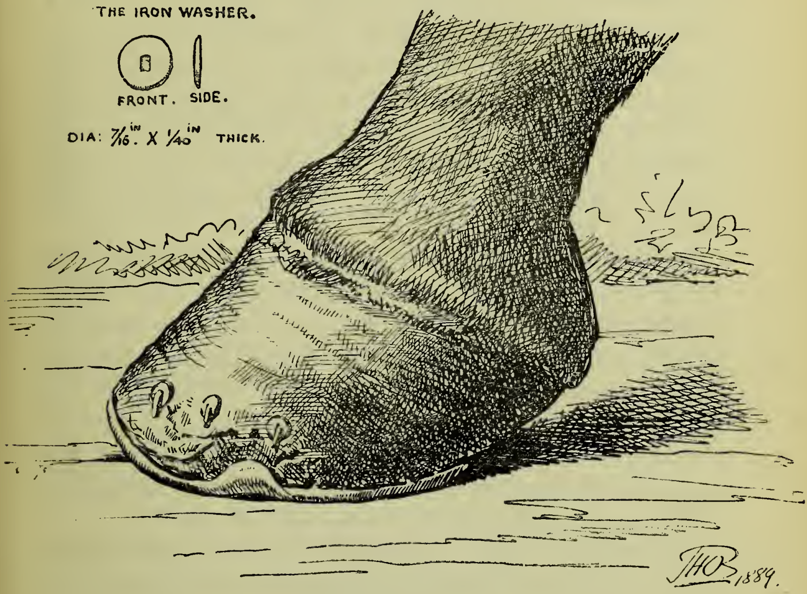


Fig. 10.

distributed over the surface of the washer, instead of being concentrated on the clinch; and, consequently, the hoof will be less liable to break away than by the ordinary method of shoeing (see Fig. 10). Supposing that we are shoeing a horse with five nails, we may have the three outer nails and the front one of the inner two nails supplied with these washers. I have tried this plan with excellent results.

Romnald Tobolewsky states that the application of lanoline renders the hoof tough. Before using it, the horn should be cleaned with cold water, and then the lanoline rubbed into the coronet and wall, in small quantities, by means of a woollen rag, until a dull gloss is produced. It may also be applied to the sole and frog.

Indigestion is not an unfrequent cause of brittle feet; for as this complaint causes irritation to the mucous membrane of the stomach and intestines, irritation is liable, by sympathy, to be set up in the sensitive laminæ which secrete the horn of the foot. When irritation and consequent inflammation exist in a secreting structure, its powers become impaired; hence the cases of weak and brittle horn secreted during attacks of indigestion, which should be specially treated.

In cases of brittle feet which have chipped away a good deal, we may apply to the exposed surfaces, from time to time, an antiseptic, such as turpentine, with the view of destroying any parasites which may be present, and which may, possibly, have induced the brittle condition of horn.

Inflammation of the Coronet or Villitis

Is, as far as I have seen, a chronic disease brought on by work on hard ground, and is confined to the fore feet. It is characterised by a swollen condition of the coronet, with more or less heat. Beyond saying that the horn looks, usually, dry and weak, I can mention no peculiar appearance of the hoof, by which this disease may be recognised. The accompanying lameness, which always increases with work, is marked by a shuffling style of progression which is well nigh distinctive, especially, when both fore feet are affected. The lameness may, after a rest, disappear for the time being; but only to return on the resumption of work. These cases, like those of chronic laminitis, may show but very slight lameness when coming fresh out of the stable, but will "work" lamer and lamer. I have seen many cases of this intractable disease in India.

Treatment.—Remove the shoe. Give a dose of linseed oil, and keep the animal on green food and bran mashes. Apply warm fomentations and poultices. When all heat has subsided, stimulate the coronet as directed for "seedy-toe," and shoe the horse so as to obtain frog and sole pressure.

Donkeys' Foot Disease (*Mal d'âne*).

This disease is almost exclusively confined to donkeys, even among which it is not very common. I have seen only one case of it among horses. It appears to be, in the first instance, a chronic inflammation of that portion of the coronet (the *perioplic ring*) which secretes the thin covering of horn (the *periople*) that covers the upper part of the hoof. This inflammation extends to the remainder of the secreting portion of the coronet, so that the wall, especially at the front, becomes dry and fissured to such an extent that in time it resembles the rough bark of a tree which has become more or less detached from the wood. In aggravated cases, this altered wall breaks off at its lower part, and splits both horizontally and vertically.

The *cause* of this disease appears to be unknown.

The *treatment* is similar to that of "seedy-toe." The affected horn at the coronet should be kept closely pared down. Oil of tar forms a good dressing.

Navicular Disease.

Nature of the Disease.—I am convinced of the general truth of Professor Williams' theory, that this malady arises primarily from inflammation of the navicular bone, or of the cartilage upon its lower surface. The inflammation extends to the synovial membrane, which lies between the navicular bone and the perforans tendon, and finally attacks this latter structure; the usual result being that the tendon becomes adherent to the bone, the structure of which becomes diseased. Small nodules, with or without ulceration, form on the surface of the navicular bone, at the part over which the perforans tendon plays.

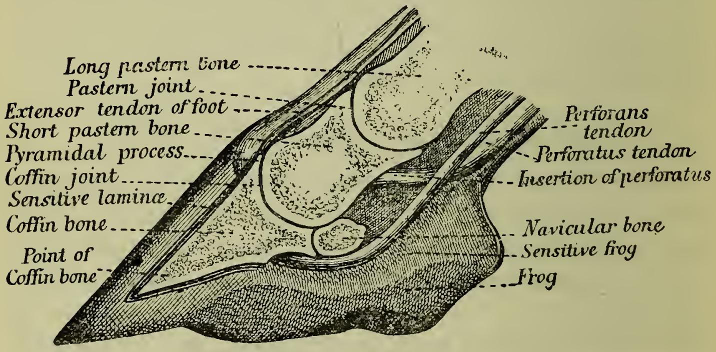


FIG. 11.

On referring to Fig. 11 we shall see that the perforans tendon is attached to the base of the coffin bone, and passes behind the navicular bone, which forms a pulley for it. On leaving the navicular bone, this tendon passes behind the pastern, fetlock joint, suspensory ligament, and knee, and is, finally, united to the muscle, by the contraction of which the foot is flexed. A horse affected with navicular disease is said, in stable parlance, to be "groggy."

Predisposing influences.—1. A naturally weak, or defective condition of bone, in the production of which the influence of heredity is well marked.

2. Altered nutrition of the bone due to chill from the practice of standing on cold stones. This supposition seems, as pointed out to me, by Mr. C. Phillips, A.V.D., to be borne out by the fact, that a comparatively large number of troop horses in England, are annually "cast" for this complaint, which, in these instances, is apparently brought on by the common routine, in cavalry stables, of keeping the horses standing, the greater part of the day, on bare stones, with not much more than an hour's exercise in the twenty-four; while the ground upon which they parade and drill is, usually, very hard. We may easily understand that the effect of this continued standing on a cold surface, which is a good conductor of heat, is to lower the vitality of the living structures of the feet, and to predispose them to become injuriously affected by subsequent concussion. In India, on the contrary, where troop horses are accustomed to stand on earth, and not on stone, and where the ground is much warmer, navicular disease is far more rare. Cab horses, which are particularly liable to this malady, have, as a rule, to do all their standing, when outside, on stone, or on metalled roads.

I must say, that however plausible the view I have advanced, may be, the facts cited are not sufficient to warrant us in asserting that it is absolutely correct; although they may suggest the advisability of providing, when practicable, a bad conductor of heat, such as wood, for horses to stand on, instead of stone; as, for instance, in stables, and on cab ranks.

Although continued standing is a frequent cause of laminitis, it does not appear capable, of itself, to produce navicular disease; whether the animal stands on a bad conductor of heat, as on board ship; or on a good one, like wet soil, as is often the case with farm horses.

3. *An upright and concave form of foot*, with very strong heels, seems to be conducive to navicular disease; probably, on account of the difficulty, with it, of obtaining sufficient pressure on the frog, to keep it and the structures it protects, in a healthy state. Flat, open heeled feet, on the contrary, are notoriously liable to laminitis.

4. *Trotting.*—I am strongly inclined to think that giving a horse his work—supposing it to be severe or ill-arranged, and the ground hard—at the trot, predisposes him to navicular disease; because animals that are most liable to this disease, do their work at that pace; but the ill effects of galloping, under similar conditions of ground and distribution of labour, are made manifest, most commonly, by an attack of laminitis. I may mention, that the trot seems to affect, more particularly, the back of the limb, as by splints and navicular disease; the gallop, the front part, as by sore shins, laminitis and villitis. This fact may be accounted for by the difference in the position of the leg, when the foot meets the ground, at these respective paces. I may mention, that, in the trot,

it is much more upright, when it comes down, than in the gallop.

Causes.—The usually alleged causes of this disease are: 1. Concussion. 2. Sprain of that portion of the perforans tendon which passes over the navicular bone (*Professor Dick*). 3. The employment of high heels or calkins (*Professor Williams*). 4. Compression, "through the weight of the body on one side, and the pressure of the perforans tendon on the other." (*Mr. Fred Smith*). 5. Rheumatism. 6. Heredity. 7. Direct injury from stones, nails, etc., "picked up" by the feet.

1. *Concussion.*—When we have to decide between the respective claims of a number of alleged causes of a disease, it is but reasonable to give priority to the one which is found, most commonly, to affect the sufferer. Harness horses that are used for quick road work, are, above all other classes, peculiarly subject to this disease; and, owing to the nature of their labour, are proportionately exposed to the ill effects of concussion on their feet and legs; the feet being specially liable to navicular disease; the legs, to splints. That thoroughly practical observer and veterinarian, Mr. Stewart, in his *Stable Economy*, remarked as far back as the year 1838, that: "Long journeys, at a fast pace, will make almost any horse groggy. Bad shoeing and want of stable care both help; but I am nearly sure they *alone* never produce grogginess. The horse must go far and fast; if his feet be neglected, or shoeing bad, a slower pace and a shorter distance will do the mischief; but I believe there is nothing in the world will make a horse groggy except driving him far enough and fast enough, to alter the synovial secretion of the navicular joint. Cart horses are quite exempt; horses

working in the omnibuses about Glasgow, always on the stones, and often at ten miles an hour, but never more than a mile without stopping, are nearly exempt. The horses most liable are those which work long and fast stages." "Stonehenge," also, justly observes that "many tolerably confirmed cases of navicular disease may, therefore, be hunted, except when the ground be hard, supposing, of course, that they are kept off the road; but no plan of management will enable them to bear the jars incidental to harness work or hacking." I think that men of experience will bear me out in saying, that the cab horses—which furnish the highest percentage of sufferers from this complaint—of places like Edinburgh, in which the roads are laid down with paving stones, are much more subject to navicular disease, than are similarly employed animals in parts where the "going" is smoother, softer, and, consequently, less productive of concussion.

2. *Sprain of the perforans tendon* at the point at which it passes over the navicular bone. Examinations, after death, of recent cases of navicular disease, almost always prove that the injury, in the first instance, was confined to the bone, and not to the tendon.

3. *The employment of high-heeled shoes or calkins.* This alleged cause may be dismissed; for, were it valid, we should find that the animals which are most commonly shod with calkins—namely, heavy cart horses—are those which are peculiarly liable to the disease in question; a supposition that is absolutely incorrect. Again, were the practice of using high heels or calkins to blame, we should certainly have many more cases of this malady in the hind feet, than the one or two isolated instances met with in many thousands,

especially as horses are almost always shod higher behind than in front. Besides, a horse suffering from navicular disease "goes on the toe," as a rule, which he would hardly do, if the disease had been brought on by identically the same course of action—raising the heel from the ground—by which he now strives to relieve the inflamed parts from pain. Also, a horse thus affected, almost always goes better in a high-heeled shoe, than in a low-heeled one; because, raising the heel tends to flex the coffin joint, and, consequently, to relieve, to some extent, the painful structures from the pressure of the perforans tendon.

4. *Compression.*—As the degree of compression on the navicular bones is affected by the rate of speed, and by the weight of the rider or of the conveyance—but not, in any way, by the nature of the ground—we would find, were compression the chief cause of the production of this disease, race horses, chasers, hunters, and heavy cart horses, (especially, those that wear "toe pieces" to their shoes) the chief sufferers. On the contrary, they are all but exempt!

5. *Rheumatism.*—Beyond the supposition that chill, as we have seen, has a predisposing influence on this disease, I know no argument that would support the theory of its rheumatic origin; for we have neither the characteristic "migratory" and feverish symptoms of the acute form, nor the peculiar changes in the bone that serve to distinguish rheumatoid arthritis (see page 163).

6. *Heredity*, no doubt, has a strong predisposing influence; but I have met with no proof that, of itself, it can induce the disease.

7. *Direct injury* may, in some rare instances, give rise to this malady.

Special liability of the fore feet to Navicular Disease.—Although it is true, as Mr. Fred Smith points out, that the horse when standing, is accustomed to rest his hind limbs, alternately, while remaining "level" in front, the respective liability is so disproportionate (say, as 1 is to 1,000), that it would be manifestly unreasonable to attempt to account for it by this practice of the *sound* horse. The difference of liability, in my opinion, is due: (1) to the greater amount of concussion which falls on the fore feet; (2) to the fact, that the hind feet, being naturally more upright than the fore feet, the concussion which falls on the former is, as a rule, thrown more towards the toe, and consequently, further away from the navicular bone, than is the case with the latter.

Symptoms.—By actual examination of the foot, the ordinary observer will discover little as to the nature of the ailment; though he may guess at its existence from the absence of signs of other diseases. The peculiarity of the animal's gait, and the manner in which it "points," will tend to confirm his supposition. There is often contraction, at the heels, of the affected foot or feet.

When standing at ease, a sound horse almost always rests one hind leg, though, on odd occasions, he may rest a fore one; this is done, however, in an attitude which betrays no tenderness.

As a rule, the horse, in this disease, "points" by placing his toe on the ground, raising his heel, and rounding his fetlock joint.

The horse, generally, unless the case be bad, walks sound, though when trotted he goes very "short," "daisy cuts," and "digs his toes into the ground;" the result of this latter habit being, especially, if only one foot is affected, that the toe of the shoe or shoes gets worn in a marked manner. Mr. Percivall observes that in trying to save the heel, the animal turns the toe in.

Travelling over hard ground affects him very much, particularly, with a weight on his back; though probably he will be able to go free and well through plough or on other soft "going." He is usually a bad stumbler on account of being afraid to raise his feet high, and to throw pressure on his heels. The lameness wears off to a great extent during exercise, which of course affords only temporary relief. In the very early stages, the horse may work lamer.

The disease is, generally, insidious in its approach, there being often nothing to mark it, further than that the horse commences the habit of "pointing" in the stable, begins to go a little short, or becomes slightly lame now and then. The owner should not be misled by the lameness working off, but should endeavour to nip the mischief in the bud; for it will prove incurable if allowed to get beyond the first stages.

Treatment.—I think that I may safely say, that treatment is but of little avail in this disease. We may, however, remove the shoe, and if necessary rasp down the crust and heels so as to obtain frog pressure. The Charlier system of shoeing might be tried with advantage. We may give a dose of physic; and feed on green food; and bleed from the toe or coronet. If there be a running stream at hand, we may make the horse stand in it for a couple of hours, two or three times a day; care being taken that the part of the bed of the stream on which he stands is soft, and that he has soft ground to walk upon, both going from and returning to his stable. Tan or peat may be used for bedding; as either of them will tend to keep the feet cool. He may be put in a darkened stall by himself, so as to encourage him to lie down as much as possible, which horses that are affected by this disease, are, usually, inclined to do. Poultices may be kept to the affected foot or feet. If a stream be not of ready access, buckets full of cold water can be used. After a fortnight, we may apply to the coronet a mild biniodide of mercury blister, say, 1 to 32 of lard.

Turning the horse out into a grass meadow for some time will often be of benefit. As the good effect of this is but transient, the animal should be got rid of as soon as possible.

After everything else has failed, neurotomy may be performed.

Palliative Shoeing.—In confirmed cases, use shoes having toes similar to those of the Thacker shoe, which are turned up, so that no toe-clips are required, while the foot surface of the shoe bears on the sole as well as on the crust; and have the heels thickened. With this form of shoe, the concussion caused by the horse striking his toe into the ground will be diminished, as much as possible, by the shock being distributed over the broad, rounded surface of the shoe.

Horn-Tumours.

Owing to the pressure of the clips of the shoes, blows or other causes; tumours form within the horn of the hoof, generally at the toe. As the pressure exerted by their presence interferes with the nutrition of the portion of the coffin bone opposite to where they are situated; an excavation is formed in that bone, which thus accommodates itself to the tumour. This affection is not always accompanied by lameness. "Generally a kind of fissure is seen in the outer shell of the wall, or a concavity or depression without any actual fissure." (*Williams.*) If a horn tumour be present, the white line which marks the union of the wall and sole on the ground surface of the foot, may be found to curve inwards at a point immediately underneath the tumour. The part should be relieved of pressure by judicious shoeing. If the animal is lame on account of the presence of the tumour, the wall should be hollowed out with the searcher from the ground surface of the foot, and the cavity may then be filled with tow soaked in turpentine. The shoe may be adjusted so as to keep the dressing in its place.

Tread

Is the term applied to a wound inflicted upon the coronet of one foot by the shoe of the other fore or hind foot, as the case may be. The usual causes are: weakness; fatigue; over-taxation of strength; and carelessness in turning the animal, especially when he is in heavy draught, and when he has been shod with "roughed shoes." This injury is principally confined to cart-horses.

Treatment.—If the wound be slight, apply a little tincture of myrrh or arnica. The spirit on evaporating will leave a thin resinous coating which will effectually exclude the air. If the tread be severe, remove all loose ends, bathe the part with warm water and apply the white lotion, alum and water, or some other astringent. If the wound begins to suppurate, poultice for a day or so, but do not continue the applications too long; as they would then tend to destroy the vitality of the structures. If, after this, the sore does not assume a healthy appearance, apply a fly blister round its edges to stimulate the part to healthy action; the blister may be repeated. A neglected tread is very apt to run into a quittor.

Pricks in Shoeing

Are caused by nails actually penetrating the sensitive parts, or by their being driven too "close." Pain and lameness may become manifest immediately after the accident, or may not appear until next day, or even for a fortnight or longer, during which interval pus (matter) forms. It may happen that while a nail is being driven, it may split into two branches, one penetrating the sensitive structures, the other passing through the wall in the usual manner. The injury done by "drawn nails" is generally more serious, and always more difficult of detection and treatment than when the offending nail has been left in. I may mention that a "drawn nail" is the term used to signify a nail which, in the first instance, has been driven in a wrong manner, and then removed.

Horses that have "worn" fore-legs sometimes go lame soon after been shod, on account of their heels having been unduly cut down, and increased strain being, thereby, thrown on the ligaments and flexor tendons. This form of lameness may easily be mistaken for that arising from a prick in shoeing.

Mode of determining the seat and extent of the injury.—If the horse, on the nail being driven, flinches evidently from pain, and, thereupon, goes lame, we may conclude that he has been pricked; especially, if the point of the nail has not come out; or has appeared high up on the wall; or if we have reason to suppose, from a dull sound of the hammer, that the nail has penetrated the quick. The appearance of blood, on a nail being withdrawn, will also be clear proof of this accident having occurred. If lameness be observed after the nails have been driven, we should first of all see if any of the nails have been driven "higher" or "coarser" than the others, due allowance being made for their relative position as regards their respective distances from the heels, at which part the wall is thinner and more upright than at the quarters, or toes. We may, then, take up, as advised by Solleysel, the lame foot, and tap lightly with the hammer round the opposite one, to see that the horse does not flinch from "fidgetiness." Having ascertained how he "stands" this being done, we should put down the lame foot, take up the sound one, and tap with the hammer on each of the clenches of the nails of the injured hoof, and also on the wall below the clenches, in order to ascertain the seat of pain. If any doubt still remains, we may take up the lame foot, and try to find out the tender spot by pinching round the crust with a pair of pincers, one claw resting against the sole within the inner edge of the shoe, while the other presses against the wall. This latter operation may be repeated when the shoe is off. On removing the shoe, the nail or nails which are near the suspected spot, should be examined, and if the injury is of some days' standing, we may detect the offending nail by observing that it is wet, which fact will indicate the formation of matter; or by noticing the existence of a stain round the nail-hole on the ground surface of the horn after the sole has been pared. On withdrawing a nail, such a flow of matter may take place that no doubt can exist as to the cause of lameness. If the puncture be quite recent, it is possible that no fluid may have escaped into the hole made by the nail. The presence of heat in the hoof at any particular spot will also aid us in our search. Having fixed on the puncture, we should endeavour to pare it out; for if this be not done, a quittor will, probably, be the result, owing to the matter which forms, not being able to find vent, except at the coronet. The usual manner in which the excavation is made, is to pare out the puncture with a fine searcher from the ground surface, taking care to cut away from the sensitive parts so as to avoid injuring them; for if they bleed, it will be almost impossible to follow up the course which the nail took. When the point of the offending nail, however, has come out through the wall, I prefer cutting, with the searcher, from the outside, straight down on the passage which the nail has made, than to excavate it from the ground surface; for, by the former plan, there is a minimum of horn removed; the risk of getting too close to the sensitive structures is avoided; and the injured part is left exposed for the application of suitable remedies: conditions which are not obtained by the latter method. If, before removing the shoe, we are quite certain of the nail, it is best to cut down on it before drawing it; but if the shoe be already off, a piece of wire or a thin nail may be passed through the hole to act as a guide. In deciding which of these two methods it is best to adopt, the question of appearance must of course be taken into consideration.

MM. Peuch and Toussaint remark that the colour of the pus (matter) found in the puncture may be black, yellow, yellowish-red, or purple. The black colour indicates that the wound is only superficial, and that when vent is given to the matter, the pain resulting from the compression it exercised on the sensitive parts, will disappear, and that recovery may soon be expected. The yellow, or yellowish-red colour points to a more serious injury. But if the discharge is of a purple colour, and putrid smell, we may conclude that death of some of the soft parts and of a portion of the coffin bone has commenced; there will probably be, also, fracture of the coffin bone. The presence of a portion of dead bone in the part may be known from the fact of the discharge tinging a silver probe black, by the formation of sulphide of silver. Our surmise as to the existence of some very serious injury within the foot, will be placed beyond all doubt, if, after paring out the puncture and giving vent to the matter, the animal still continues to suffer great pain.

Treatment.—We should, first of all, pare out the puncture, in the manner already described, and may then bathe the foot in warm water and apply poultices by the aid of a poultice boot or piece of cloth; or place the foot, as advised by the French veterinary surgeon, M. Rey, in a solution of sulphate of copper and water, in the proportion of 1¾ oz. to 1 pint. The horse may stand in this for from half-an-hour to an hour. These baths, which are very highly spoken of, may be continued for several days. The inflamed sensitive tissues, which may bulge out into the excavated cavity should not be cauterised, as they will regain their proper size when the inflammation subsides. If we have reason to suspect that there is *fracture of the coffin bone*, or other grave injury, we should cut away the wall over the part, and remove all the dead tissue, including any splinters of bone. This will be an operation too serious for an amateur to attempt. A saturated solution of iodoform in ether, or of boric acid in water, may be used for the wound.

For constitutional treatment, if the pain be great, give 1½ pints of linseed oil, and ¾ oz. of nitre, daily, in the drinking water. The animal should be kept on laxative food. If the pain continues to be excessive, give 2 ozs. of laudanum in water, as a drench.

Results.—Death, frequently, ensues from a puncture which involves the coffin bone, unless the part be well and promptly opened out. If this be not done, even a slight prick which is followed by suppuration, will, in all probability, give rise to quittor.

Wounds of the Sole and Frog

Are occasioned by "gathered" nails, pieces of broken glass, stumps of wood, sharp stones, &c.

It often happens that when the offending substance has wounded the foot by penetrating the cleft of the frog, an inexperienced observer will imagine that the tendons or ligaments have been sprained, on account of the effects of the inflammation extending up the leg. This swelling requires no treatment; for it will subside as the inflammation in the foot abates.

The navicular bone sometimes becomes fractured by puncture. There will be great pain and high fever accompanied by a discharge of synovia tinged with blood, which will become dark and fœtid. Recovery to a state of soundness, in this case, is hopeless.

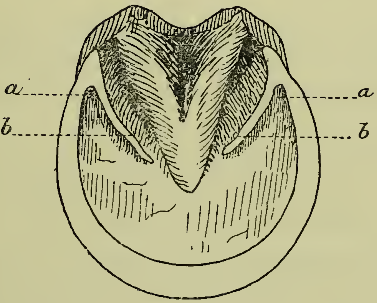
Treatment.—Remove the foreign body; open out the part so as to allow of the escape of matter. With the object of avoiding tetanus, apply some effective antiseptic, such as Jeyes' Fluid (see page 520), or phenicated camphor (see page 517). Treat as directed under "Pricks in Shoeing" (see page 123).

Preventive Measures.—On no account thin the sole or pare the frog, but allow the foot to retain its natural protection. Do not use "stoppings," which will make the sole and frog soft and spongy.

Corns.

Definition.—Corns are bruises of the membrane which secretes the horny sole and which covers the ground surface of the coffin bone.

Fig. 12.



a Seat of Corn. | *b* The Bars.

Nature.—That portion of the sole which lies in the angle formed by the wall and bars, and which is called the "seat of corn," is the spot which is peculiarly liable to this injury; because the sole is thinnest there; the horse, in all his paces, places his heel first on the ground; and the sensitive sole is apt to be pressed upon at that part, by the horn of the wall, in the event of the heels being allowed to grow too long, especially, if the bars have been cut away. The remarks on "the weight-bearing surfaces of the foot," made on page 586, may be referred to here.

Liability.—The horses that are most liable to corns are those that have weak heels, and those with very strong ones. When the injury occurs in the latter case, it is due to the heels being allowed to grow too long, in which condition the wall at the heels is apt to incline inwards ("wire in") and then, when weight is put on the heels, the secreting membrane (sensitive sole) is apt to be pinched between the coffin bone, which it covers, and the horny sole upon which the overgrown wall has encroached. Corns are most frequently found among horses that have to do fast work on hard ground.

Some horses have naturally such weak feet that, when worked on hard ground, they are liable to get corns, notwithstanding every precaution taken as to their shoeing, &c.

Position.—Although corns occur frequently in the fore feet, it is very exceptional to find them in the hind ones; the reason being that the latter are far less exposed to concussion than the former. Their soles, also, are, naturally, more hollow, and, consequently, are less exposed to injury. The fact that the inner heel is much more liable to corns than the outer, is usually accounted for by the supposition that more weight is thrown on the inner than on the outer side of the foot. The more perpendicular position of the wall of the former than of that of the latter may, however, have some influence in the same direction.

Causes.—The chief cause is a faulty system of shoeing by which pressure becomes applied to the "seat of corn." The common and pernicious practice of cutting away the bars, undoubtedly, disposes the foot to contract this ailment; for the heels, when they lose the support afforded by the bars, are apt to wire in; in which case, the pressure of the heel of the shoe will fall on the seat of corn. It sometimes happens that, when "preparing" the foot, the smith rasps down the wall at the heels without also reducing the horn over the seat of corn, and thereby allows the latter to bear the greater part of the pressure, with the natural result of this injury. Again, when the heels of the shoe are "sprung," that is, when a space is left between them and the horny heels, grit and particles of stone are apt to work between the web of the shoe and the "seat of corn," and, consequently, to hurt the latter on account of its being constantly hammered upon by the former, whenever the animal moves. The use of calkins is liable to cause corns by localising, on the heels, the effects of concussion with the ground. In some rare cases, corns are produced by the horse treading on a stone or other hard body; which will very seldom occur if the sole be not "thinned." When the ground surface of the foot has been reduced too much, the sole may become bruised at any part pressed upon by the web of the shoe, especially, if the animal is worked at a fast pace and on hard ground. As mentioned before, some horses have such weak feet that it is almost impossible to prevent them getting corns by any system of shoeing; for, in their case, the concussion produced by the iron on the wall of the hoof at the heels, appears, when the animal is worked on hard ground, sufficient to set up an irritable state in the seat of corn, which condition will be manifested by more or less lameness, even when the characteristic red mark in the horn is not present. Allowing the heels to grow too long, as previously remarked, is also a cause of corns. When shoes are kept on an inordinately long time, they are apt to become shifted in position and to press on the seat of corn; and, also, the web of the shoe may become so thin, as to get out of shape and press on the same spot.

Lameness resulting from corns.—Corns do not always produce lameness. When a horse goes lame from this cause, he "works" worse and worse. If, however, he gets a rest for a day or two, the lameness may disappear for the time being.

When a horse suffers from a corn, he may "point." If both fore feet are affected, he may show uneasiness by frequently changing his position.

The different degrees of corns.—(1) The simplest form of corn, according to M. H. Bouley, is when the sensitive sole, immediately above the seat of corn, is in such an irritable state from pressure or concussion, that the horse goes lame; although, on paring out the part, no alteration in the colour of the horn can be perceived; increased sensibility being the only symptom. (2) In the next degree of corn, some of the small blood vessels of the sensitive sole become ruptured, and, consequently, blood escapes from them into the rudimentary horn which has been newly secreted, and which, on becoming pushed downwards by the continued formation of new horn, dries and hardens, while still retaining the characteristic stain from the blood. If, on paring out the corn, the discoloration appears only on the surface, we may conclude, provided the animal goes sound, that the injury was of a passing character; if only close to the quick, that it was recently inflicted; if the stained horn is in layers with unaltered horn between them, that it was repeated on different occasions; and, if the whole of the horn down to the quick be discoloured, that the source of irritation was of a constant nature. (3) When the inflammation has been so severe as to set up a certain amount of inflammation short of suppuration taking place, a watery exudation filters through the horn below the injured spot, rendering it wet, especially, close to the sensitive sole, and tinging the neighbouring horn with a more or less yellow colour. (4) The most serious form of corns is when suppuration (the formation of pus) takes place; for, in this case, unless the part be opened out, the constantly increasing matter will force its way up to the coronet, as that will be in the direction of the line of least resistance, and will, consequently, produce a quittor. It may, also, cause disease of the lateral cartilages, or even of the coffin bone. Such complications may be so grave as to threaten the life of the animal.

Preventive measures.—Shoe as directed in the chapter on "Shoeing"; or shoe *à la* Charlier. Narrow-heeled shoes which rest only on the wall at the heels, although recommended by some for the prevention of corns, are not, as far as I have seen, efficient for that purpose; for, by taking off the pressure on the bars, they throw too much weight on the wall, and hence are liable to set up irritation in the sensitive sole at the angle between the wall and the bars. If an ordinary shoe is used, the web of the shoe at the heels should be broad, so that the concussion received from the ground may be distributed over a large surface, and it should project a little beyond the heels, so as to obtain a good bearing. The bars should be preserved intact, the seat of corn should be slightly eased off, and the horse may be shod with leather placed between the sole and shoe. When the tendency to corns is very great, a three-quarter shoe (see page 594) may be used with advantage.

The feet should be kept dry, and no "stoppings" should be used; as moisture would soften the sole and render it liable to injury.

Treatment.—Remove the shoe. Pare out the seat of corn to see if there be any suppuration; but do not remove more horn than is necessary for this object; as it would be injudicious to deprive the sensitive sole of its natural protection without good reason for doing so. If matter has formed, free vent should be given to it, and the foot should be poulticed for two or three days. The part may be stimulated by the application of oil of turpentine, or the sulphate of copper foot baths (see page 123) may be tried. If the corn does not readily heal, pass a red-hot iron into it and freely burn the diseased parts. If the discharge has a stinking smell, we may conclude that the coffin bone or lateral cartilages are involved; in which case, the part should be opened out and the diseased portions removed by a veterinary surgeon; as the necessary operation will be beyond the skill of an ordinary amateur. If quittor be present, it should be treated accordingly. After an ordinary corn has been examined, a three-quarter shoe may be applied, or a short bar shoe (see page 595), if the frog is strong enough to bear the pressure, so that all weight may be taken off the foot near the seat of corn; for no matter how carefully the shoe is applied, the injured part will be jarred if the web rests on any part of the bar or wall near it. The further treatment of the case will consist in allowing the corn to grow down, and in keeping pressure off the part.

Quittor

Is a canal filled with diseased matter, which opens at the coronet, above the quarters or heels (hardly ever at the toe), and extends down between the wall of the hoof and sensitive parts of the foot. It may consist of a single passage, or may have two or more branches. "It comes in the form of a hard conical tumour, hot and tender on pressure; indeed, sometimes so painful as to occasion considerable lameness." (*Percivall.*) It, usually, suppurates slowly.

Quittors are, generally, caused by "treads," and, less frequently, by neglected corns, pricks in shoeing and other wounds which set up inflammation in the sensitive parts of the foot. They may also occur from frost-bite of the coronet; especially, when salt is used to clear away the snow, as is sometimes done on tramways. When the injury comes from below, as would be the case with a corn or prick in shoeing, the matter which is continually being formed, follows the line of least resistance, and gradually works up to the coronet and, also, round the sensitive laminæ. When the hurt is inflicted on the coronet, in the first instance, the matter (pus) lodges behind the wall, which forms a sort of rim at that part, sets up diseased action in the structures with which it comes in contact, and, gravitating down, gradually burrows one or more passages between the wall and the sensitive parts of the foot.

Quittors are principally confined to heavy draught horses; as these animals, from the nature of their shoeing and work, are much more liable to injuries that produce this affection than are those of lighter breeds.

Owing to wounds inflicted by the sharp calkins that are used during frosty weather, this disease is most common at that period of the year.

The cure of a quittor is, as a rule, a tedious affair, which will, generally, occupy at least two or three months.

Treatment.—Remove the shoe, and if necessary pare the sole to discover if the quittor has been caused by a wound on that part. If such has been the case, make an opening from below, so as to allow of the downward escape of matter. If we find that the tumour has "come to a head," it is advisable to open it with the knife, and then to apply a fly blister around it, in order to stimulate it to healthy action. But if it is already discharging matter, poultice it with carrots, turnips, or bread; treat as for abscess (see page 194), and blister. These means, and the injection of a solution of corrosive sublimate 1 drachm, water 1 oz., with a few drops of hydrochloric acid to dissolve the salt of mercury, will, usually, be sufficient to effect a cure. When a poultice is employed, a piece of thin muslin should be placed under it to prevent any of its contents getting into the wound. If there be no opening from below, and if such simple measures as blisters, poultices, and injections fail, we may open out the diseased parts freely with the drawing-knife or searcher to expose it, and to allow for the escape of matter. We may, then, boldly burn the diseased parts by passing the firing iron at a red heat over them. When the slough comes off, a healthy wound will be left, which will soon heal. This is the most effective and humane way of treating a bad quittor.

In neglected quittors, we often find that the coffin bone or lateral cartilages have become diseased. In such cases, the horn which covers the sinus must be removed and the diseased parts cut away with the knife, or destroyed by the red-hot iron. I may remark that when the cartilage is diseased or dead, it will be of a sulphur yellow, instead of a white colour.

Forging or Clicking.

As this habit sometimes causes injury to the foot, and as it may often be remedied by suitable shoeing; it is not inappropriate to consider it from a veterinary point of view, and not merely as a riding or driving vice.

Definition.—Forging or clicking is the act done by the horse, at the trot, of striking a fore shoe with the hind hoof or shoe of the same side. The term is usually applied to the noise thereby made.

Manner in which forging takes place.—Generally, one of the heels of the fore shoe is hit by the hind foot, as may be proved by the fact that in the majority of cases, a horse which forges will not be heard to do so, if he be shod in front with tips. Also, when instances are noted of the hind hoof being injured by the practice of this habit, it will be found that the front of the hoof, at some spot intermediate between the ground surface and coronet, will become, more or less, deeply indented, which could not take place, if, as is often supposed, the front part of the web of the fore shoe were struck by the toe of the hind foot.

Causes.—(1) Inability to lift up the fore foot quick enough to remove it out of the way of the hind foot. This may be due to an "uncollected" method of trotting, by which the horse throws too much weight on the fore hand, which he may do when going either too slow, or too fast; to weakness; to fatigue; or to ill-regulated shoeing. (2) To a vicious habit acquired by the horse, who appears to obtain some kind of amusement from hearing the "click, click" of his feet.

Remedies.—(1) Preserve the proper slope of the fore feet, by lowering the toes, or raising the heels, as the case may require. This slope should, with ordinary shaped feet, be about 50°. (2) Use tips. (3) Have the horse properly broken, and ride or drive him, so that he may trot in a collected and well balanced manner. (4) If the forging be from weakness, attend to his general health. (5) If it occurs only when the animal is tired, the remedy is obvious. (6) The Americans, the soundness of whose knowledge on all matters connected with trotting is incontestable, recommend, for preventing forging, the employment of heavier shoes in front than behind; the respective weights being, say, 14 oz. and 6 oz. each shoe. The use of heavy shoes will improve the action in front, and may be discontinued after a time.

CHAPTER IV.

DISEASES OF BONE AND CARTILAGE.

SPLINTS—SORE SHINS—RINGBONE—BONE AND OCCULT SPAVIN—OSTEOPOROSIS OR BIGHEAD—RHEUMATOID JOINT DISEASE—SIDEBONES.

Splints.

Definition.—According to the popular view, a splint is a bony deposit which appears on the side of the leg, between the knee or hock and the fetlock. Following the teaching of Mr. Percivall, it might be more correct to say that a splint is a bony deposit which connects the cannon bone with one or both of the splint bones.

Cause.—I may mention that each of the splint bones is firmly united to the cannon bone by a strong interosseous ligament. As in the large majority of cases, bony deposits (with the exception of "sore shins") on the leg between the knee and the feltock, occur somewhere at the junction of a splint bone and the cannon bone; we may fairly surmise that they are brought on by inflammation being set up in this interosseous ligament, or by inflammation of the splint-bone as a result of concussion.

Splints are usually confined to the fore legs; but are also found on the hind legs, in which case, owing to these limbs being much less exposed to the effects of concussion than are the fore extremities, they are rarely of any serious detriment to the animal.

Varieties of splints.—Solleysel, followed by Percivall and Williams, divided splints into five classes, viz.:—

1st. The simple splint, which is away from the knee, and does not interfere with the tendons and suspensory ligament. (See Fig. 13.)

In the majority of cases, splints are of the simple form, which, as it occasions but little lameness, is of trifling consequence as far as the usefulness of the horse is concerned.

2nd. The double or pegged splint "occurs when there are two splints, one upon the outer, the other upon the inner side of the leg, directly opposite to one another, as though they were *pinned* together through the leg, from which they derive the denomination of pegged." (*Solleysel.*) The existence of this bony communication, on the back of the cannon bone, may always be inferred from the fact of the presence of the two deposits just described. This pegged splint is *one* bony deposit, not two, and of necessity can hardly fail to interfere with the action of the suspensory ligament; for although, in time, it may, to a certain extent, accommodate itself to this structure, it will hardly ever do so sufficiently to permit of fast work. I may observe that the quicker the pace, the tighter will this ligament be pressed, at each stride, against the bony deposit.

3rd. The splint close to the knee.

4th. Two splints, one above the other, and on the same side of the leg. This form shows considerable weakness of the bone, and almost always causes lameness, especially, when the two splints are united by a bony ridge.

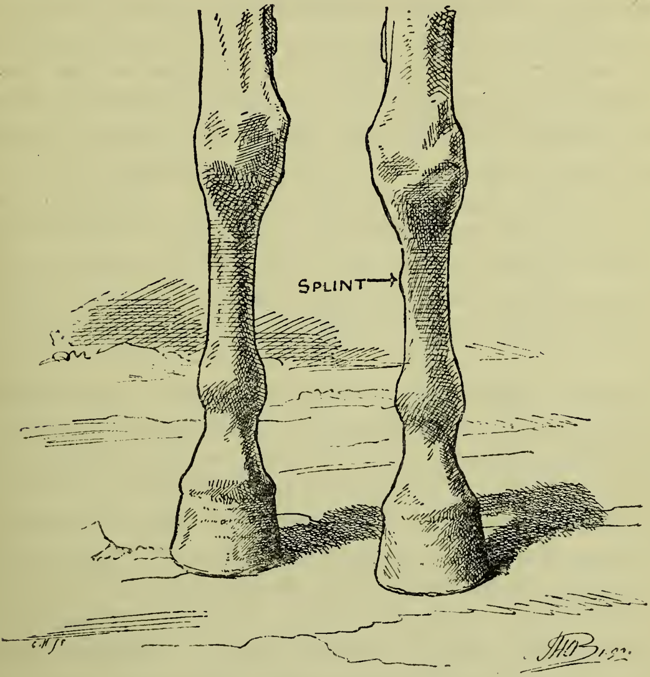


FIG. 13.

5th. A bony deposit involving the cannon and splint bones with those of the knee, with which they articulate. This bony union usually occurs between the head of the internal splint bone and the lower surface of the small bone—the trapezoid—of the knee, with which it forms a joint.

Gravity of splint as regards variety of horse.—A splint on the leg of a heavy cart horse is not so objectionable as one on that of an animal required for fast work, and, especially, for trotting.

Occurrence of splint on inside rather than on outside of leg.—The fact that splints occur more frequently on the inside than on the outside of the leg, is usually accounted for by the form of the bones of the fore extremity; for we shall find that the internal articulating cavities on the long and short pastern bones are larger, and are, consequently, intended to bear more weight than the external ones. This seems to prove that more weight is thrown on the inside than on the outside of the leg, and, for this reason, the former, rather than the latter, suffers from the effects of concussion. The consideration of the shape of the foot—the inner quarter of the hoof being more upright than the outer—and the fact that "corns" are much more commonly found on the inside than the outside heel, strengthen the supposition that more weight is thrown on the inside than on the outside of the leg. Provision being, apparently, made for this by the articulating surfaces of the former being larger than those of the latter, as far as the fetlock and pastern bones are concerned, I think we must look for some other explanation. A very feasible one is afforded us by the manner in which the lower bones of the knee articulate with the splint bones. On the outside, the small knee bone (the *unciform*) bears its weight on the outside splint bone and also on the cannon bone; but the inside small knee bone (the *trapezoides*) rests almost entirely on the inside splint bone, upon which the effects of concussion must, consequently, be severer than upon its fellow. The greater liability of the inside of the cannon bone to suffer from splint, than the outside, may, to some extent, be due to the fact that splints are often brought on by blows, and that the inside of one leg is apt to be hit by the opposite foot.

Age as affecting splints.—Young horses (five years old and under) are most liable to splints; for their bones are more full of blood than at a more advanced age, when the elements of nutrition are supplied to the bones by the blood-vessels in a decreased amount. We may, also, conclude that the younger the horse, the greater probability there is of his becoming lame from a splint. Besides this, young ones are more liable to "hit" themselves, than are older animals.

Causes.—Concussion from quick work, under heavy weights, and especially from trotting on hard ground, is the usual cause of splints. They may, also, arise from blows.

Heredity. — The influence of hereditary predisposition is well marked. Besides this, the formation of the legs themselves induces liability to this disease, especially, when the animal is heavily "topped."

Predisposition.—I think I may say that, as a rule, under-bred horses, and those reared in damp climates and on succulent food, are, owing to the more porous and more vascular nature of their bones, more subject to splints—supposing that they be put to quick work—than are better bred animals, and those which are brought up under hardier conditions.

Gravity of splint according as it is on inside or outside of leg.—A splint on the outside of the leg, is generally more serious than one on the inside, especially, if it be well forward, and high up; for it will then be apt to interfere with the extensor tendon of the long pastern bone, which is on the outside of the knee, and goes down the front of the cannon bone.

Symptoms.—" A splint is detected by grasping with the hand the horse's suspected leg in the ordinary manner in which we *feel* the leg, and tracing, with the fingers upon one side and the thumb upon the other, the inner and outer splint bones from their heads downwards to their tapering extremities. Any actual exostosis will at once arrest the hand; any rising or irregularity will create suspicion and lead to closer examination." (*Percivall.*) On the other hand, as remarked by Professor Williams, " The lameness may precede the appearance of any swelling or deposit, and in such a case it is apt to be confounded with that arising from other diseases." He further teaches that, on this account, in the examination of a case ot obscure lameness, especially if the animal be young, one should never fail to look out for the signs of splint-lameness, namely, that the lameness at the trot is out of all proportion greater than that at the walk, that the animal, usually, fails to bend the knee freely, and that exercise increases the lameness. The last mentioned condition is also present with corns, but an examination of the foot will determine the question of their existence. Young horses with obscure splints which cause lameness, are often suspected of having navicular disease, and get rejected accordingly. Respecting this, one should recollect—1st, that the lameness of the latter affection gets better as the animal becomes warm with exercise; and 2ndly, that horses five years old and under, very rarely are troubled with navicular disease. Some horses, by an unusual development in the size of the inner splint bones of their fore legs, appear, at first glance, to have splints on both of them; although the limbs may be free from any diseased growth of bone. In such a case, the splint bones will feel, to the touch of the fingers, free from any bony deposit. When deciding on such a point, one should carefully observe if both the inner splint bones be of the same size.

If the swelling which causes the lameness in the case of a recent splint be perceptible, there will, usually, be heat, and pain on pressure.

The lameness occasioned by a recently-formed splint is in no way proportional to the size of the deposit; for small splints often cause extreme lameness, while large ones, sometimes, occasion little or no inconvenience. In the former case, the lameness is probably due to inflammation deeply seated in the bone; but, in the latter, the increased action may be almost entirely confined to the covering membrane of the bone, which "grows as the tumour grows, and so accommodates itself to the increased superfices it has to spread over, without suffering any tension." (*Percivall.*) Young horses lately put to work, not unfrequently become lame from splints before any swelling appears on the bone. In such a case, knowledge of the animal's age will assist us in arriving at a correct opinion. An exaggerated form of inflammation in the substance of the bone, may occur from the effects of violent concussion; when, instead of a splint being formed, the effusion failing to get vent, is deposited in the bone, thus preventing that part, by blocking up its canals, from receiving nutrition; the result being that death of the affected portion of bone ensues.

A splint which interferes neither with the knee joint nor with any tendon or ligament, causes lameness only during its period of formation.

Treatment.—If the newly-formed splint does not produce lameness, it should be left alone. The horse should be kept on laxative food of a diminished amount, and his exercise restricted to light work at a walking pace on soft ground, until the splint is fully formed, and all inflammation has left the part.

If the lameness be slight, give a purgative; allow, if possible, no exercise; apply hot fomentations, and give a rest; but if this be not sufficient, rub in a smart biniodide of mercury blister (1 to 8 parts of lard) in order to hasten the process of absorption. If it is inexpedient to give the animal a long rest, as in the case of a race-horse in training, the blister may be applied in the first instance. If the lameness be very great, perform periosteotomy without delay, and cut boldly and deeply into the new growth, so that the inflammation may be relieved by the bleeding from the congested vessels within the bone, as well as by division of the over-stretched covering membrane. I need hardly say that this operation should never, owing to the danger of producing open joint, be performed in the vicinity of the knee. After periosteotomy, a seton may be passed over the divided structures; the needle being made to enter the aperture which has been cut in the skin, and may come out a little higher up than where the point of the knife penetrated. In order to obviate the chance of a serious blemish, the seton should on no account be allowed to remain in longer than a fortnight.

Periosteotomy "is performed by making a transverse incision with the rowelling scissors, immediately below the enlargement, introducing the periosteotomy knife flatwise under the skin as far as the upper end of the splint, turning the cutting edge inwards to the bone, and cutting through the periosteum into the new formation. It may be necessary to cast the horse, but, as a rule, the application of the twitch keeps him quiet enough." (*Williams.*) In order to diminish the sensibility of the part, we might make four or five subcutaneous injections (see page 574), near the intended incisions, of about 10 drops each of a 5 per cent. solution of hydrochlorate of cocaine.

When a splint interferes with the action of the opposite fore-leg, the veterinary surgeon may, under antiseptic conditions (see page 169), carefully dissect down upon it, and remove the bony growth with the bone forceps or gouge.

Sore Shins

In their fully-developed state, may be said to consist of bony formations on the lower third of the cannon bones: they differ from splints only in their position. The deposit is usually on the front of the bone; hence the name. The disease being due to concussion, is generally confined to the fore-legs; although, sometimes, all four cannon bones are implicated. Like splints, sore shins are far more common among young horses than among older animals; but, unlike the former, they are confined almost entirely to race-horses, which animals get their work principally at the gallop, in which pace the heel is brought to the ground at a moment when the cannon bone is extended; and, consequently, as the shock is transmitted vertically upwards from the heel, its effects will be felt at the lower part of the cannon bone, *i.e.*, at the seat of sore shins. In the trot, the heel meets the ground when the cannon bone is in a much more upright position than it assumes at the gallop—in fact, the foot comes as nearly as possible, flat down; hence, trotters seldom suffer from sore shins, although they are subject to splints. Probably, the majority of two-year olds that are trained, suffer, at one time or the other, from this ailment.

Sore shins, unless taken in time, is a serious disease. which, in some cases, proves fatal.

Symptoms.—The first symptom, generally perceived, is that the horse begins to go a little "short" in his gallop, especially, if the ground be at all hard, although he may act as well as ever through "dirt." On being pulled up after a strong gallop, he may be found to walk very sore and tender, although hot fomentations and a rest for a day or two may apparently set him right. All that is required to develop the symptoms is to put him to fast work again, without loss of time. He will then, probably after the first gallop, be found to be hardly able to hobble along at a walk. Above and in front of the fetlock joint or joints, as the case may be, there will be a swelling which will be elastic and fluctuating at first, then firm and "doughy," will "pit" on pressure, and, finally, will become hard. The state of the case is, as explained by Professor Williams, that the swelling was originally due to thickening of the periosteum, which covers the bone, and to the presence of an exudation beneath that membrane; secondly, that effusion took place into the cellular tissue which lies beneath the skin; and thirdly, that the exudation beneath the periosteum became organised into bone. During the first or acute stage, the swelling will be painful to the touch; the horse will be lame and go very "short;" there will be more or less fever; and the animal will keep shifting his feet, if both be affected ;

or point the toe and flex the fetlock joint, if one only be implicated.

Treatment.—Blister the part, in the first instance, with biniodide of mercury ointment. This will almost invariably effect a speedy cure, and will generally prevent a recurrence of the ailment. Give a mild dose of physic, and keep the horse on laxative food. If the animal be a young race-horse, he will, probably, be fit to resume easy work in ten days' time.

In neglected cases, or if the blister does not succeed in producing the desired effect, and the swelling is very extensive and the pain great, periosteotomy must be performed without loss of time, in order to admit of the escape of the exudation, which, by the pressure it exerts on the inelastic and highly sensitive periosteum, is the cause of the intense pain and fever. Besides this, if the exudation be considerable, and it be allowed to remain between the surface of the bone and the periosteum, death of the bone may ensue ; the process being, that this exudation, becoming converted into bone, will block up the small canals through which the bone receives nourishment by means of small blood-vessels proceeding from the periosteum. Before operating, one should carefully feel for the position of the extensor tendons, which run down the front of the cannon bone, so that these important structures be not injured. The skin should then be pinched up, and the incision made well away from where the subcutaneous opening into the periosteum is to be effected. If the skin is very tense, make the incision through it with a sharp bistoury, and then use a probe-pointed one. In all cases be particular to make the incision into the skin as small as practicable, in order to prevent, as much as possible, entrance of air into the wound. (See page 169.)

"In some rare cases the exudate becomes converted into a thin, sanious (bloody) matter, which corrodes the surrounding tissues, causing great febrile disturbance, and the death of the patient from its absorption into the general circulation." (*Williams.*) When this condition is perceived, periosteotomy should be performed without loss of time.

After a severe case of sore shins, an appropriate rest should be allowed, and, then, when the horse is again put to work, he should be exercised only on soft ground, so that there may be a minimum of the original cause of the disease, namely, concussion. I need hardly say that at first the work should be confined to walking, trotting, and slow cantering. When the horse is put to a faster pace, the gallops should be short, and, if need be, repeated, with half an hour or so walking exercise allowed between, so that the bones of the legs may be saved from long-continued jar. The advisability of warm fomentations after a gallop will naturally suggest itself to the trainer.

An attack of sore shins, in which the exudation has been extensive, will give a more or less rounded appearance to the front part of the cannon bone when viewed in profile.

Ringbone

Is a bony deposit, the result of inflammation, which forms on the long and short pastern bones, and also on the coffin bone. It is of three kinds, namely:—(1) False ringbone, which may be regarded as a splint on the long pastern bone, situated on one or both sides of it, while in some cases it extends to the front of the bone. This form, although not nearly such a serious affection as the true kind, occasionally causes lameness on account of the presence of the deposit interfering with the action of the lower portion of the suspensory ligament. (2) High ringbone is the term applied when the deposit involves the pastern joint. This is more common than the next variety, and may be readily seen in the form of a swelling on the front of the pastern (See Fig. 14). (3) Low ringbone, when the bony formation affects the coffin joint. This is by far the most serious kind, owing to the unyielding nature of the horny wall of the hoof which surrounds the implicated joint.

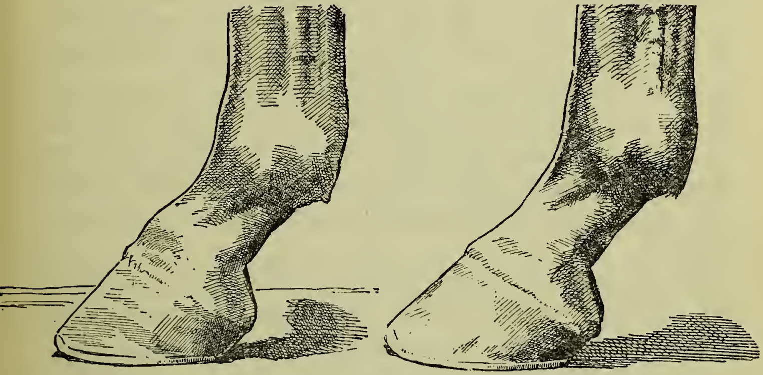


Fig. 14.

These bony deposits are usually confined to the front and sides of the bones, and have a tendency to surround these parts. If they extend to the back of the joints, they will give rise to most intractable lameness. In the hind feet, they are probably due to compression of the pastern bones; and in the fore feet, according to Professor Williams, to sprain of the capsular and lateral ligaments of the pastern joint, in which case, the symptoms may somewhat resemble those of "split pastern." Ringbones are more common on the hind, than on the fore feet, though the opposite is the case with sidebones. The difference, here, is probably due to the fact that, in the hind feet, more work is thrown on the toe; but, in the fore feet, it falls principally on the heels. I need hardly observe that the lateral cartilages are situated towards the back of the foot; while the seat of ringbone is to the front. I have seen, on different occasions, cases of lameness from ringbone, which had been induced by the horse "going on his toe," owing to a previously existing spavin.

We should not reject a horse because his pasterns are "rough," that is, large and with prominent processes of bone for the attachment of tendon and ligament, as this is the best shape; always supposing that both pasterns are the same.

In the early stages of ringbone, a horse becomes lame before any deposit is formed or any swelling takes place; for, here, the cause of the pain is inflammation in the structure of the bone itself. When lame from this cause in the fore-foot, the horse goes on the heel. The fact that the condition of the hoof, and the state of the pulse and internal temperature is healthy, will show that the animal is not suffering from laminitis. The symptoms and gait also differ from those of villitis. Writing about ringbones Professor Williams remarks:—"When at the sides they do not cause the same degree of lameness as when the front is involved."

I have often observed in the lameness of ringbone, that the horse lifts his foot off the ground in a peculiarly stiff manner, evidently, with the object of trying to bend its joints as little as possible.

Ringbone must not be confounded with sidebone, which is ossification of the lateral cartilages of the foot.

Treatment.—Professor Fearnley's advice as to firing deeply and then blistering once or twice the moment ringbone manifests its presence, is most reasonable; because, if we delay, enough bony material may be thrown out, in a short time, to permanently destroy the free use of the joint. The prompt use of the iron is the best means to arrest the diseased action, and to cause the absorption of the bony material which has already been deposited. If the horse goes on his heel, use a thin rocker shoe (see page 98); if on his toe, employ a high-heeled shoe.

The operation of neurotomy is specially indicated in chronic cases of lameness from ringbone. It not unfrequently brings about absorption of the deposit.

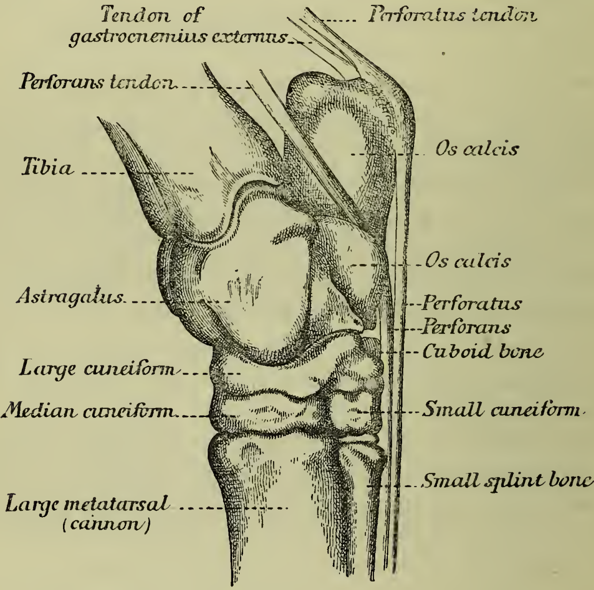
Bone and Occult Spavin

Anatomy.—In the hock (see Fig. 15, page 150), we have the true hock joint, formed by the astragalus and tibia, which serves for the bending of the leg; while, to diminish the effects of concussion, the three cuneiform bones are placed between the cannon bones and astragalus.

In bone spavin, as a result of inflammation, there is a deposition of bone on the inner and lower part of the hock, commencing, usually, between the cuneiform medium and the cannon bone, or between the two large cuneiform bones. The higher this bony formation extends, the more serious is the disease. When the spavin is low down, being simply confined to the joint between the cuneiform medium and the cannon bone, it is of little consequence; as bony union of that joint

Fig 15.

Internal View of Hock.



does not affect the horse's action to any appreciable extent.

Mr. Percivall justly lays stress on the fact that horses should not be condemned indiscriminately on account of having a so-called low spavin, which, he contends, is, in many cases, a veritable splint, and has no connection with the cuneiform bones.

I believe that a splint, having the appearance of a low spavin, rarely occurs on the head of the cannon bone without involving the cuneiform medium also; although union of these bones frequently takes place without the action of the animal being affected in any perceptible manner, as there is very little motion in that joint. The cuneiform medium, at the seat of spavin, has a naturally well-marked bony ridge on its surface, which gives it the appearance of having a small splint. The reader may satisfy himself on this point if he takes the trouble of examining this bone in the dead subject.

The more to the front of the hock the bony deposit is situated, the greater danger is there of its giving rise to lameness; for, when the hocks are bent, during exertion, the most of the pressure falls on the bones to the front of the joint; while the bones to the rear have comparatively little strain thrown on them.

The lameness of spavin in horses six years old and under is usually curable; but not that of old horses (see remarks on occult spavin, page 153).

Coarse hocks need not be viewed with suspicion if both be exactly similar and there be no lameness.

If an "aged" horse has coarse hocks and goes sound, especially, if he has good action, there is little probability of his becoming lame in them. Young horses, often, have enlarged hocks which fine down as they grow older.

In naturally coarse hocks, the cuneiform bones are large; hence, this shape is the one best adapted for diminishing concussion.

The usual causes of spavin are concussion and sprain of the hock, the latter being brought on by jumping, "putting the horse on his haunches" in military riding, &c.

Hunters are liable to spavin; as the stress, when leaping, is thrown particularly on the hocks. For this reason, good hocks are indispensable in cross-country animals, and also in race-horses which may be required to go up a hill. Mr. Percivall remarks, "We do not so frequently observe spavin in race-horses and horses that have lengthy, blood-like quarters; neither are 'sickle-hocks' nor 'cow-hocks' thereto disposed: this may arise from their experiencing less concussion than hocks of another description." The obvious reason that race-horses do not so often suffer, is that, with them, the weight of the rider is placed well forward and they are not "collected" in the same manner as the hunter or charger; besides this, they are usually ridden in a snaffle.

Horses are said to have *sickle-hocks* when these joints are unusually bent. With a *straight dropped hind-leg*, the limb, when fully extended, is almost straight from the stifle to the fetlock. When the points of the hocks are turned inwards, the term *cow-hocks* is used to denote the peculiarity of shape.

In cart-horses, high calkins are liable to induce spavin, on account of their causing the weight to be more directly thrown on the cuneiform bones and the head of the cannon bone, than is done when the heels are low.

This is especially the case when the animal is going down-hill with a weight hehind him.

Horses "*tied in below the hock*" are, naturally, subject to spavin. The tying-in consists in the fact of the cuneiform bones, and the head of the cannon bone being small: a conformation that presents a small surface over which concussion has to be distributed. It gives the hock a short and weak appearance.

Occult Spavin is the term used to signify that condition of the hock in which no external evidence of disease can be observed, although the lameness due to pain in the part may be of a most inveterate form. We have here ulceration of the surfaces of the bones which form the joints. In health, the different bones of a joint never touch each other, as they are separated by articular cartilage. In ordinary bone spavin, this cartilage becomes ulcerated as the result of inflammation extending from the bones, and is finally absorbed; while the exudation thrown out from the blood-vessels of the bones is converted into a bony material, which causes bony union and consequent destruction of the joint. Here, we have a reparative process with cessation of inflammation. In occult spavin, on the contrary, the process stops short at ulceration, and no reparative action takes place at all; hence, the serious and intractable nature of this form of the disease. Occult spavin is naturally much more common in old, than in comparatively young horses; for, in the latter, the materials of repair are much more abundant than in the former. As the inflammation, and not the deposit, constitutes the disease, we must regard bone and occult spavin as one and the same complaint.

Symptoms.—The lameness of spavin is characterized by want of freedom in bending the hock, which causes the horse to go on his toe and wear the shoe at that part; and by the lameness getting better as the horse "warms up" at exercise. In severe cases, and especially in occult spavin, the lameness "consists in a sort of spasmodic catching up of the spavined limb the moment the heel of the foot comes down upon the ground, something after the manner of stringhalt." (*Percivall*). Sometimes, the stiffness can only be observed when the animal is pushed over from one side to the other in his stall. A spavin may often be detected when riding a horse down a steep hill, from the fact of his "dragging the toe." "The time of all others when a spavined horse will be apt to manifest his lameness will be the day following after a hard day's work; and when he makes his first egress from the stable in the morning is the critical period for examination." (*Percivall.*) Therefore, we should be prepared to form our judgments quickly in these cases; for the longer the animal is trotted up and down before us, the sounder will he generally become. At the end of each trot past, he should be turned a different way. I mean, first to the left about, then to the right about, so that one may see on which hind leg he turns best. If there still be a doubt, the foot of the suspected leg may be taken in the hand, drawn upwards and held, so that the hock may be kept bent for a minute or two, and then the foot may be let down; when, if disease be really present, lameness will become very apparent, if, after that, the horse be trotted.

We may have the visible sign of spavin—swelling at, and hardness of the part—without lameness. If there be heat and tenderness on pressure, lameness will, almost certainly, be present. A careful comparison should be made of both hocks by the eye, when, if they are found to be exactly similar and no trace of lameness present, the horse may be passed as all right. Each hock should be viewed while the observer stands close to the side of their respective fore-legs, and should see if there be the slightest difference between the two hocks, or prominence on the site of spavin of either. "Now it is precisely the interval between the prominence of the hock ceasing and the cannon beginning—the part of the superficial line which constitutes the *dip* from one into the other—that is *the site of spavin;* a small round tumour interrupts the natural declivity from the hock to the cannon, and in a moment catches the eye of the experienced observer. In cases where the tumour, from its smallness or flatness, or diffuse character, is indistinct to the eye, the examiner will not make his mind up concerning it until he has narrowly compared the suspected with the sound or normal hock." (*Percivall.*) See Fig. 16. He should satisfy himself by feeling both hocks, the near with the right, the off with the left hand. A more correct impression is conveyed by a light and moderately rapid touch, when running the hand down, than by dwelling long and pressing hard.

The existence of a spavin in the form of a small point of bone, towards the front of the joint, often causes severe lameness, and is difficult, if not impossible, to be detected without feeling the hock with the hand.

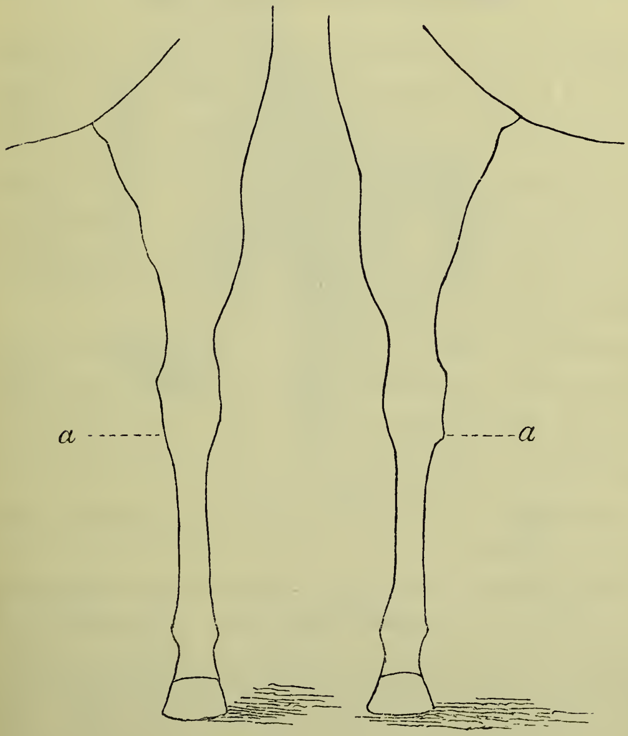
When a horse is chronically lame from spavin, the muscles of the affected limb tend to waste away considerably from inaction. In severe lameness of the hind extremities, the animal evinces great disinclination to lie down, and his condition suffers accordingly.

Treatment.—In the very early stages of this lameness, with or without heat and swelling at the site of the spavin, we should endeavour to subdue the inflammation before any structural change takes place; the best means being the employment of a high-heeled shoe, to throw the part into rest; the administration of a dose of physic (aloes); the application of warm fomentations; and rest. If the case does not yield to these simple means, the part should be blistered, fired, or setoned.

If a seton is used, it should be passed under the skin in a vertical direction, entering a couple of inches above the prominence, and coming out an inch or so below it. The incision through the skin may be made with a rowelling scissors. A blunt-pointed seton needle should be employed, and some blistering ointment may be smeared over the tape before introducing it. The horse need not always be cast; a twitch, and holding up the corresponding fore-leg, being all that is usually needed. The part may after that be blistered with biniodide of mercury ointment. The seton should not be allowed to remain longer in than ten days or a fortnight, so as to avoid the chance of a blemish. Give the horse a mild dose of physic and put him on laxative diet. He should be kept quiet in a loose box for a month, or until all inflammatory symptoms have subsided. If this treatment does not succeed, fire the part deeply. The method I would prefer is to fire deeply through the skin down on to the deposit at three or four different points, as the case may require, with a pointed firing iron. This is most effectual, and will leave little or no blemish. Or the instrument for pyropuncture may be used. Or the part may be fired deeply in the usual manner by drawing horizontal lines about half an inch apart. Firing, with the ordinary iron, for spavin, should, if possible, be done

Fig. 16.

Front view of Near-Hock free from Spavin. | Front view of Off-Hock suffering from Spavin.



a.. ...Site of Spavin.

to the horse standing; as the lines can then be drawn straighter than when he is on the ground. The front of the joint should not be touched with the iron, for the resulting scars would be liable to crack when the animal resumes work.

A high-heeled shoe is indicated in spavin lameness.

Osteo-porosis or Big-head

Appears to be a constitutional disease which manifests itself by a swollen condition of the bones, and by more or less general paralysis. The characteristic swelling of the bones of the nose, owing to their prominence and porous nature, attracts most attention. In fatal cases, the animal seems to die from exhaustion. It attacks all classes, and both sexes of horses. As a rule, it is confined to young animals; although I have known instances of nine or ten-year olds having died of it.

Chances of recovery.—As far as my experience goes, animals which are affected with *osteo-porosis*, and which are kept under the conditions that give rise to it, invariably die from it. The only hopeful cases are those which are early taken in hand.

Duration.—The disease usually runs a chronic course of some months.

Geographical distribution.—This disease appears to be confined to no particular country. Although I have noticed its occurrence, chiefly, in Eastern Bengal, Singapore, and South China—all of which places have a hot, moist climate—I must, however, admit that I saw a large number of cases (all confined to one stud farm) in the native state of Bahawulpore in the Punjab, the climate of which is dry and hot.

Symptoms.—I have remarked that the characteristic swelling of the face appears midway between the top of the nostril and the eye (see Fig. 17). The enlargement is diffuse; though fairly well defined. With but very few exceptions, in the cases I have seen, both sides of the face have been affected. In the exceptional instances, which I saw only in their early stage, the enlargement had appeared quite suddenly. I do not think there is any definite rule as to the speed with which this growth

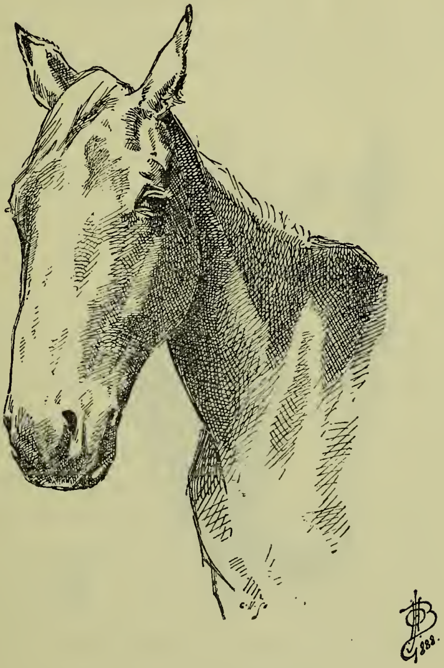


FIG. 17.

increases. I have known instances in which it appeared very slightly; remained quiescent for some months; and then rapidly increased until the animal shortly afterwards died from this disease. When the enlargement is well marked, it gives the face a flattened and swollen appearance (see Fig. 18). The bones of the lower jaw are, also, generally swollen. We must remember, that although the bones of the face are the only ones visibly affected, other bones (especially, porous ones) throughout the body participate, more or less, in the derangement,

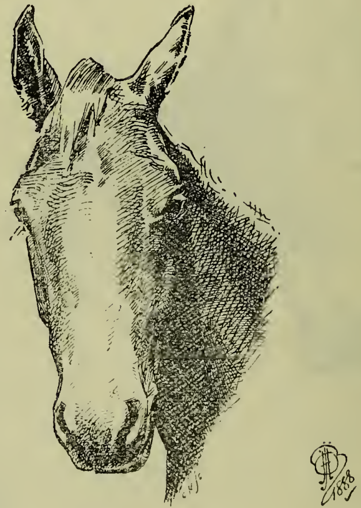


FIG. 18.

The mucous membrane of the mouth appears swollen and pale, and is covered with a copious supply of dirty-looking mucus. With the advance of the disease in the bones of the lower jaw, the teeth become loose. I have seen some good instances in young horses, of dentition being retarded to a marked extent by this complaint.

Soon after the swelling of the bones of the face has become manifest, the animal may be observed to go stiffly "all round.' In the natural course, this stiffness will soon unmistakably assume the character of general paralysis, which appears to be due to the bones becoming so wanting in tenacity that they lose their power of affording firm attachment for the various tendons and ligaments.

Appearance after death.—The enlarged bones are abnormally vascular and extremely brittle.

Causes.—I believe feeding on innutritious grass to be one of the chief causes of this disease. I have observed in every case I have seen, which have amounted to many score, that the sufferers had been previously kept on this kind of fodder. I saw this fact well exemplified in Hongkong, where the Happy Valley forms the only pasture-land. As this is a more or less flat piece of ground, about 1¼ mile round, nearly on the level of the sea, and as it receives almost all the water that drains off the sides of the neighbouring hills; the grass on it, in that tropical climate, is, naturally, very coarse and rank. One gentleman whom I knew there, had five ponies that died from this disease, all of which had shown symptoms of it only after having been turned out to graze in the Happy Valley. He had no case of it among those of his ponies which had not been turned out. While in the colony, I met other horse owners whose experience was similar to that of this gentleman.

I once had in India, a lately-imported five-year old Australian mare, which I had put on green grass (it was in the rainy season); as she was hidebound and in bad condition. She became listless and slightly paralysed, and quickly developed on one side of the face the characteristic swelling of *osteo-porosis.* I at once had her fed on hay which had been made from young oats, and was glad to see the enlargement subside, and the mare get all right in a few days.

I once saw at the Bahawulpore Stud Farm in the Punjab a great many cases—about 20 per cent. of the entire number—of *osteo-porosis.* The young colts and fillies had a fair supply of corn; but the grass was so coarse and innutritious as to be altogether unsuitable for horse provender. Besides this, it was grown on ground which was small in extent, and which had remained unchanged and untilled for years.

This disease does not appear to be due to an insufficient supply of corn; for we find, all over the world, horses in perfect health on grass alone. Besides, I have known it, in Ceylon, appear among young horses that had been kept for several months previously, on a very liberal allowance of oats. Their grass, however, was coarse and rank.

Deficiency in the supply of grass cannot induce *osteo-porosis*; for thousands of horses in Egypt, Syria, Arabia and other places, remain free from this disease; although for nine or ten months of the year, they get no grass; their only food being barley and barley straw. As horses in the open contract the disease, confinement cannot be regarded as a cause.

A second cause, advanced by Dr. Geo. H. Berns (see *American Veterinary Review*, Dec., 1890), is residence in a damp situation, such as a stable in a cellar, or on low ground. I believe that pit ponies are specially liable to this disease.

Treatment.—Dr. Berns states that he has seen well-developed cases cured solely by change to a dry location. Feed on good hay; if possible, that made (as is the custom in Australia) from young oats. If sound hay be unobtainable, I would substitute for it, bran and straw, say, seven pounds of the former (to be given dry), and a full supply of the latter.

Mr. Woods, F.R.C.V.S. (*The Veterinary Journal* for August, 1879), writes:—" Several slight cases, which were at once brought out of the [coal] pits, recovered. They were put in loose boxes at the farm, and treated with a mild laxative (linseed oil), followed by mineral tonics and chlorate of potass dissolved in the drinking water. Mashes and grass were given as food." A pint of linseed oil would be sufficient as a laxative; and a drachm of sulphate of iron might daily be given in the food, and 1 oz. of chlorate of potass in the water. Salt should be supplied.

If the animal recovers after having had the disease for some time, the head will permanently present the characteristic appearance caused by the disease. I have found in two or three cases, that the resulting alteration in the nasal passages made the horse a confirmed " roarer."

Rheumatoid Joint Disease (*Rheumatoid Arthritis*).

Definition.—This is a chronic inflammation which causes diseased changes in the bones, articular cartilages, and synovial fringes of the joint, and destruction of that portion of the cartilages which is subjected to pressure between the two bones, and is accompanied by an ivory-like deposit on the exposed parts of the bone

Joints that are affected.—In the vast majority of cases, the hock is the joint that suffers. The stifle and knee appear to be the only other articulations which are liable to this disease.

Cause.—The cause of this disease in the horse, is still more obscure than it is in man, in whom it seems to have, in some instances, though not in all, a certain connection with previous attacks of acute rheumatism; hence, its name. In the horse, it appears to have no such connection. All that I know of its origin in that animal, is that it occurs only (as far as I have seen) in old horses, which, presumably, have done a good deal of hard work.

Nature of the disease.—The bones that form a joint, do not come in contact; but are kept apart by the articular cartilages which, respectively, cover them, and which form two smooth surfaces, that, being lubricated by the synovial membrane (see page 239), work on each other without injury. When this disease invades a joint, the bones, after a time, come into contact, by reason of the wearing away of the articular cartilage, and being unfitted to bear friction, inflammation ensues, with the result of an ivory-like deposit being formed on the surfaces of bone which had, previously, been covered by cartilage. This new deposit does not admit of free motion; as its surface is comparatively rough, and somewhat irregular. On this account, the friction between the two hard bodies, sometimes, gives rise to a creaking sound during progression. The effect of the inflammation in the remainder of the cartilages and synovial fringes, is to convert them into bone, and to cause a deposit of bony material about the part.

Symptoms.—The only generally-supposed characteristic symptom is the creaking sound which I have already noticed, and which is usually heard, when the horse begins to move after rest. It is only fair to say that some hocks which are perfectly healthy, emit at times this creaking sound, which, therefore, cannot be regarded as peculiar to this disease, although, possibly, it may be a constant symptom. There is always a certain amount of stiffness in the joint, with, at times, marked lameness. In some cases, I have seen sudden and most painful lameness occur, while the horse was at work, even to the extent of the animal holding up the affected limb off the ground, for a short time. This seizure would pass off after a rest. The cause of it, I presume, was the detachment from the bony deposit, of a particle which got between the articulating surfaces. Sometimes, there is deformity of the joint, owing to the presence of bony deposit.

A horse with this disease may continue capable of a fair amount of work for years.

Treatment appears to be of no avail. A horse thus affected, should be put only to light labour. In the stable he should be induced to lie down, as much as possible.

Sidebones.

Sidebones is the term used to express an ossified condition of the lateral cartilages, which are the elastic continuations of the wings of the coffin bone, and are situated above the heels. The ossification may be partial or complete, and may affect both cartilages, or only one. Professor Williams considers that the office of these cartilages is to restore, by their elasticity, the soft structures immediately above the heels to their original shape, when the horse raises his foot from the ground. Lateral cartilages are peculiar to the horse family.

When sidebones occur, they are, almost always, confined to the fore-feet; and, in the majority of cases, only affect cart horses. I think I may say that at least fifty per cent. of heavy draught animals, in large towns in England and Scotland, suffer from them.

When they occur from injury, the cartilage on the outside quarter is the one that is, usually, affected. In such cases, the cartilage at the heel may retain its elasticity. Such instances often occur among horses imported into India from the Colonies; and are, probably, as a rule, brought on by tread from over-crowding.

Sidebones in aged cart horses that go sound and well, are of little consequence, especially when confined to the hind feet. The case with a saddle or harness horse is very different.

Causes.—I can offer no satisfactory explanation of the causes of sidebones, beyond attributing them to hereditary predisposition, or injury. Concussion can be no prominent factor; for if it were so, they would be specially frequent among cab horses and fast trotters, which very rarely suffer from them. Probably, the shape of the feet, and, possibly, the use of calkins, may have a good deal to do with their production.

Symptoms.—The ossified cartilages may be readily detected by pressing the coronet, just above the heels, and along the quarters, with the fingers: the cartilages, naturally soft and yielding, will, when ossified, be hard and inelastic. As a rule, there will be a hard swelling at the back of the coronet and heels, with heat and tenderness, if in the early stage; later on, the part becomes hard and inelastic. Sometimes, the ossification takes place at a point well forward on the quarters, and may, then, be mistaken for ringbone, from which it may be distinguished by the fact of its forming a ridge that stands apart from the short pastern bone. In this form, which is a serious unsoundness, we may have the ends of the cartilages at the heels elastic. If lame, the horse goes "short" and "on the toe;" a form of action which somewhat simulates the gait of navicular disease, but is not so quick in the removal of the foot from the ground; in fact, it is a "stumpier" style of going, if I may be allowed the expression. If sidebones be present, there will be little difficulty in deciding the point. Sometimes, the cartilage of one side only is affected; which will cause the animal to "dish" the leg either outwards or inwards, as the case may be, so as to relieve the affected side.

Treatment.—Use a bar-rocker-shoe (see page 98), so as to get pressure on the frog, if that part be strong. If the frog be weak, put on a simple rocker-shoe. Foment the part. Stop work. Blister or fire so as to hasten the process of ossification, on the completion of which the inflammation will cease. Neurotomy is indicated if the lameness proves obstinate.

Mr. Fred Smith, A.V.D., has introduced with good results, the practice of giving mechanical relief from the pain of sidebones, by isolating the portion of hoof which covers the inflamed cartilage, from the remainder of the horn. This he does by making a vertical groove through the horn, beginning close to the coronet at a point immediately in front of the inflamed part, and terminating it on the ground surface of the foot. This groove should pass through the horny wall. A similar groove, but cut in the direction of the fibres of the wall (sloping downwards and forwards) should be made, commencing at the coronet just in rear of the seat of inflammation.

CHAPTER V.

WOUNDS AND THEIR RESULTS.

WOUNDS IN GENERAL—ANTISEPTIC PRECAUTIONS—GENERAL TREATMENT OF WOUNDS—OVERREACHES—BRUSHING—SPEEDY CUTTING—BROKEN KNEES—OPEN JOINT—PUNCTURES FROM THORNS, ETC.—ABSCESS—SADDLE AND HARNESS GALLS AND INFLAMED WITHERS—POLL EVIL—BURNS AND SCALDS—WOUNDS OF THE ABDOMEN—PERITONITIS AS A RESULT OF CASTRATION—BLEEDING AFTER CASTRATION—SCIRRHOUS CORD—INFLAMMATION OF THE JUGULAR VEIN FROM WOUND.

Wounds in General.

Varieties of wounds.—Wounds may be divided into : 1. Clean cuts; 2. Punctures; 3. Lacerated wounds, *e.g.*, " broken knees ; " 4. Bruises. We may have one or more of these occuring from a single injury.

Methods of repair.—1. By immediate union. Here, the parts being brought into exact contact, unite in a few hours, without any perceptible material being deposited between them ; hence, there is no scar. To obtain this result, there must be little or no inflammation. 2. By primary union, by adhesion. In this, the cut surfaces are glazed over by a fluid which is exuded from them, or by the coagulation of a thin film of blood, and the divided ends of the blood vessels are thus sealed up. This exudation becomes, subsequently, converted into fibrous tissue, and leaves the appearance of a white scar. 3. By granulation. This is a tedious process which is accompanied by the formation of pus. It is the one by which, as a rule, all wounds, except clean-cut ones, heal. 4. By healing under a scab.

We may have repair of a wound by one or more of these methods, at the same time.

Antiseptic Precautions.

As the formation of pus entails the destruction of tissue, which can be replaced only in an imperfect manner, and as the absorption of pus is liable to give rise to blood poisoning; our efforts should be directed to prevent the formation of pus, which results from the entrance into the wound, of minute fermentative germs that exist in the air, and in water. In corrosive sublimate, carbolic acid, boric acid, iodoform, and many other antiseptics, we have efficient agents for destroying these putrefactive ferments. Ordinary oil has a protective influence on them,and, consequently, is much inferior, as a "vehicle," in this respect, to glycerine, or vaseline, which, also, are antiseptics. Although the process of boiling destroys these germs, we need not resort to it, when using water as a solvent; for the antiseptic employed, will kill all the germs contained in the fluid. Were it always possible to have absolute cleanliness of hands, instruments, dressings, etc., in surgical operations, there would be no need, when performing them, to employ any other antiseptic precautions. As, however, it is very difficult to rigidly ensure this condition, and as the application of an antiseptic entails but little trouble; it is always well to employ it, when using the knife. In accidental wounds, on the contrary, it is often impossible to prevent putrefactive contamination ; hence, the need of an antiseptic. I may state generally, that, in accidental wounds, the application of a mild antiseptic will be efficacious, if employed within an hour, or, perhaps, two, of the infliction of the injury. We must remember that the use of antiseptics in all these cases, is to allow the wound to heal by the first, second, or fourth method, and that, to be effective, the germs must remain excluded, until the wound is healed. If pus be allowed to form, it will be impossible to obtain repair, at that spot, except, by granulation. The antiseptic employed should be just strong enough to kill the putrefactive germs that may have gained entrance into the wound, or to render their surroundings unfavourable to their development, but no more; for if it be sufficiently powerful to coagulate the albumen of the exposed surfaces, or to otherwise injure them, the destroyed parts will have to be removed by the formation of pus, and repair must then take place by granulation.

Corrosive sublimate is one of the best antiseptics for general use; a solution in water of 5 grains to the pint ($\frac{1}{2000}$), being quite strong enough. For surgical operations, half this strength will be sufficient. It should be noted that when corrosive sublimate is selected as the antiseptic to be employed during an operation, it should not be used for washing the instruments; as the sublimate, even in a highly diluted solution, is destructive to steel. Professor Anderer points out, that when undistilled water is used, some of the sublimate is apt to become changed in composition by the carbonate contained in the fluid—a circumstance that may be guarded against by the addition of a quantity of common salt, equal in weight to that of the sublimate.

Carbolic acid being volatile, is specially useful in the treatment of deep wounds and abscesses. It may be employed in a 3 per cent. solution, that is, 15 grains to the ounce. If the acid be not quite pure, it will be well to previously dissolve it in four times its weight of glycerine. For instance:—

Carbolic acid	$\frac{3}{4}$ oz.
Glycerine	3 ,,
Water	1 pint.

Impure carbolic acid, I may mention, is sparingly soluble in water.

The great objections to carbolic acid are, that it, sometimes, has an irritating effect on wounds, especially when it is used too strong; and that it is sparingly soluble in water. The fact of its being volatile, renders dressings saturated with it, inert after a short time; unless they are covered with an impermeable material.

Boric (boracic) *acid* "is an antiseptic agent of considerable power without any irritating qualities, causing the destruction of low organisms without endangering in any way the vitality of the living tissues. Hence its great value in surgery as a dressing, either as an ointment, or as a lotion (5 per cent.), or as boracic lint, prepared by soaking lint in a hot saturated solution of the acid, and drying." (*Dr. W. Whitla*). Boric acid is too feeble in its action for use in deep-seated wounds.

Boroglyceride, which is obtained by making a saturated solution of boracic acid in boiling glycerine, may be used in the same manner as boracic acid.

Iodoform is a slightly volatile and most effective antiseptic. It may be used: (1) In the form of fine powder to be dusted over the surface of the wound.

Although this is not in as fine a state of division as precipitated iodoform, it is better for surgical purposes; for it does not clot. (2) Dissolved in ether (1 to 10), which, on evaporating, will leave a fine covering of iodoform that might not, otherwise, gain access to the part; as in the case of sinuses. (3) Dissolved in flexible collodion (5 grains to 1 drachm), which, on drying, will supply a protective coat. (4) Dissolved in eucalyptus oil, or in oil of turpentine. (5) As an ointment; 1 to 9 of lanoline, lard (benzoated, for choice), or vaseline.

Eucalyptus Oil is a valuable and powerful antiseptic.

Oil of Turpentine is an admirable antiseptic, and is specially useful as an application to unhealthy and indolent sores. It is cheap, and can be procured under most circumstances.

Jeyes' Fluid may be employed, with advantage, in all cases in which carbolic acid is generally used; as it is quite as good an antiseptic, and possesses the great advantages of being perfectly soluble in water, and of being far less irritating in its effects. It is a kind of coal tar obtained by the dry distillation of pit coal. Its manufacturers claim that it is free from poisonous products.

Antiseptic surgery.—When it is important that surgical wounds should heal in as perfect a manner as possible, the operation, when practicable, ought to be performed under antiseptic conditions. For instance, the instruments should be thoroughly cleaned, and they, as well as the operator's hands and the skin of the part, should be carefully washed with strong carbolic or other effective antiseptic soap, and scrubbed with a clean nail brush. It is well to steep the instruments in undiluted Jeyes' fluid, or carbolic acid. The hands, and skin of the part, may then be washed in a 5 per cent. solution of carbolic acid, or Jeyes' fluid. The wounds may be douched with a $\frac{1}{2000}$ solution of corrosive sublimate, or a 3 per cent. (5 drachms to the pint) solution of Jeyes' fluid or carbolic acid in water ; and dry dressing by means of antiseptic cotton wool and gutta-percha tissue applied ; care being taken that efficient drainage is ensured ; unless, indeed, all bleeding has ceased.

Owing to the difficulty of fixing dressings on a horse, and to the unfavourable circumstances under which we have sometimes to treat them, we may often, when unable to adopt the better plan, profitably content ourselves by using some strong antiseptic, the effect of which will be to keep the wound healthy for a considerable time ; even when it is freely exposed to the air. Although the wound, in this case, will heal by granulation ; still, it will do so under as favourable conditions as possible. "*Chloride of zinc* has the remarkable property of producing such an effect upon the tissues of a recent wound, that when applied once as a watery solution of about forty grains to the ounce, the cut surface, though not presenting any visible slough, is rendered incapable of putrefaction for two or three days, even when exposed to the influence of septic (putrid) material. The patient is thus tided over the dangerous period preceding suppuration, during which the divided tissues are most prone to inflammation and the absorption of septic products. Hence this agent, though not adapted for general use, is of the highest value when it is impossible to exclude septic organisms in the after treatment." (*Dr. John Bishop.*)

General Treatment of Wounds.

1. *Stop the bleeding.*—There is, rarely, much difficulty in doing this, if the bleeding be from veins only; cold water, slight pressure, or the application of ice, snow, or a lotion of the tincture of the perchloride of iron and water—1 to 8—being generally sufficient. We may know that an artery is cut, by the bright red colour of the blood, and by the manner in which it jets out. In this case, we should endeavour to pick up the end of the artery nearest to the heart, with a forceps, or tenaculum (an instrument having a fine hook made for the purpose), and tie it with thread. And, then, pick up and tie the other end; or we may stop the bleeding by a touch with a firing iron at a dull red heat. This will, probably, fail, if the vessel be of any considerable size, unless when aided by, for instance, a clam, as in castration. An attempt to tie should always be made, when there is persistent bleeding in a jet. Pressure, also, may be employed, especially, if the wound be on one of the legs, when a tourniquet may be improvised by placing a round smooth stone just above the wound, and as near as possible on the course of the artery; while a handkerchief, bandage, or other cloth, should be passed round the limb, over the stone, and loosely knotted. A stick may then be placed between the skin and the cloth, at any convenient part, and twisted gradually round, so as to cause the stone to press on the artery. This, of course, must only be a temporary measure; for, if continued, it will cause gangrene, owing to stoppage of circulation in the isolated part.

Oozing of blood may, usually, be at once arrested by the application of water at a temperature just short of what would scald the skin.

2. *Remove all dirt, clots of blood, and other foreign matters.*—We may do this by gently syringing the part with recently boiled water which has been allowed to cool to about blood heat; or, preferably, with an antiseptic solution. Clean linen rags soaked in an antiseptic should be used instead of sponges which are seldom thoroughly clean, and should, consequently, not be used, unless we are certain of their purity. We should avoid touching the wound more than is absolutely necessary. If the injury be superficial, without the parts being bruised, we may allow the blood to remain on, so as to form a scab.

3. *Destroy any putrefactive germs that may have gained access to the wound*, by the application, as already described, of an antiseptic.

4. *Bring the edges of the wound together.*—It is best, in all cases, to bring the divided surfaces, as soon as possible, together; if drainage can be ensured. If, however, this be not practicable, and the wound be deep; we may "allow the wound to remain open for six or eight hours; or, if we employ sutures we should leave them loose, so that they can be easily tied afterwards. At all events, we leave the wound so far open that the blood and serous discharge may escape; and after a few hours we may wash out any clots, bring the edges accurately together, and so secure them." (*Spence.*)

The edges of a superficial wound may be kept in contact by strips of ordinary adhesive plaster; or of cotton cloth covered with glue, or saturated with collodion. The hair round the wound should be previously shaved off.

Sutures, if possible, should be dispensed with, as they are apt to blemish, and are not very successful in veterinary practice: a fact that is probably owing to the difficulty experienced in keeping our patients at rest. Silver, or annealed iron wire of different sizes, made for the purpose, forms the best general suture, for wounds that are likely to gape. When this is not anticipated, we may use cat-gut (carbolised, if obtainable), which has the advantage of becoming absorbed, when its function is fulfilled.

The two kinds of stitching usually employed, are the *interrupted* and the *twisted* suture. Each stitch of the former is complete in itself. The latter consists of a curved pin which is kept in position by thread wound between the two ends in a figure of 8.

In making the stitches, the edges of the wound should be accurately brought together, in the natural position of the parts; care being taken to avoid any incurling of the skin. The wire, pin, carbolised cat-gut, or thread, as the case may be, should, with the aid of a pin director, or curved needle, be passed through one side, and out at the other. The sutures should be about half an inch from each edge, about an inch from each other, and should go deep enough to obtain sufficient hold. While this is being done, the lips should be held together by an assistant. "The general rule is to tie the middle stitch first: this, however, is of no great matter. The chief precaution required is that they be introduced at correspondent opposite points, so that, when they come to be drawn tight, they meet each other in straight or parallel lines, and confine the sides of the wound evenly and uniformly together, without wrinkling the skin or giving the parts any harsh or unnatural constraint." (*Percivall.*)

5. *Secure rest.*—This should be done, generally, as well as locally; and may be accomplished by slings; splints (see page 218); bandages; tying the horse's head up; the administration of opium; or even by the application of a blister.

6. *Dress the wound.*—The part having been made healthy by the application of an antiseptic, it is well, in almost all cases in which we can secure rest and proper attention, to apply a *dry* dressing. This may be done by taking a piece of cotton cloth of convenient size, which should be dipped in a solution of corrosive sublimate (5 grains to the pint of water), and dried; and covering the wound with it. We may, then, place over this, seven or eight thicknesses of corrosive sublimate gauze (which can be procured from any chemist); and secure the whole by a bandage not too tightly put on. The sublimate gauze is, I may mention, apt to have an irritating effect on the wound, if applied directly on it. The whole may be covered over by gutta-percha tissue, which can be got in any drug shop; so as to still more effectually exclude all disease germs. The wound may, now, be left untouched for six or seven days; by which time, it ought to have healed in a perfectly healthy manner, and ought to require no further special treatment. Bandages may be of use in preserving the proper position of the parts; but care should be taken that they are applied evenly, and not too tight; else their presence may give rise to an unhealthy condition of the wound, from interference with the circulation of blood. If the part inflames, whether from the action of sutures, plasters, or bandages, these appliances should be removed and the part bathed from time to time, with some weak antiseptic lotion, applied by means of a piece of lint, or cotton cloth.

We may know that the process of healing is not going on in the desired manner, if we observe constitutional disturbance, with rise of internal temperature (see page 575); discharge of matter; swelling and unusual heat of the part; and (which is a ready and reliable guide) a mawkish odour about the dressings. But if inflammation does not ensue to any marked extent, the wound should not be interfered with, by fomentations, or lotions of any kind.

The free escape of matter should always be provided for, at the lowest point. For this purpose, a *drainage tube*, which can be got at any chemist's shop, is most useful. If pus forms, the wound should be freely opened out, and should be treated with special regard to rest and cleanliness.

Appearance of wounds.—We may say that a wound is *healthy*, when it looks like a clean cut, or as if a piece had been cleanly punched out of the tissue; *unhealthy* when it is pale, and covered with pus, or small clots, and with large, soft granulations; *inflamed* or *angry*, when it is of a dark red colour, with a good deal of heat; and *indolent*, when the process of repair appears arrested, as in a "sit-fast."

Unhealthy and indolent wounds will, probably, require the application of some stimulant—such as phenicated camphor, carbolic acid, nitrate of silver, blue stone, or oil of turpentine—to induce healthy action, by drawing an increased supply of blood to the part for repair. With the same object, we may blister the skin round an indolent sore; or even apply the hot iron freely over it, especially when the sides of the wound have become hardened, and have, to a certain extent, lost their vitality, as in old abscesses. When the wound is the seat of some noxious growth, as in "bursatee," we may render it healthy by the free use of the knife.

Inflamed wounds should be treated by continued bathing in, or with, warm water, or by poultices; so as to relieve the unusual tension, soothe the irritation, and hasten the process of repair by granulation. Except for this object, poultices should not be applied to wounds; as they tend to destroy the vitality of the part, and prevent repair by the first two methods.

Punctured wounds are the most dangerous variety; as the undue retention of their contents is apt to give rise to serious inflammation, and to grave constitutional disturbance, from the absorption of putrid material They should be carefully disinfected by an antiseptic and well drained. As it is very difficult to do this effectually when these wounds are deep, we can rarely hope that they will, then, especially when caused by an accident, heal in any other manner, than by granulation. Hence, in these cases, the free escape of pus should be provided for, by the opening out of the wound, if necessary; and the part should be liberally bathed with a warm antiseptic solution.

If a *scab* which has formed over a sore, be wounded; or if it becomes loose before healing is complete; or if fluctuation can be detected under it, it should be removed by poultices, or by bathing in warm water in order to allow of the escape of pus, and the exposed surface should be treated with iodoform (for choice), or some other suitable antiseptic. But if the wound under the scab be healthy, it should on no account be interfered with.

In the early stages of *bruises*, we may, often, by the aid of very hot (just short of scalding), or very cold applications, cause absorption of the fluid which gives rise to the swelling, and thus arrest the formation of pus; but if suppuration has already set in, we must give vent to the pus by the knife, without delay; for the longer it remains, the greater will be the destruction of healthy tissue, which, I may add, can never be replaced, except by grafting. We should have recourse to poultices only when the exact position of the pus is doubtful. That being determined, the knife should be used.

If the injury be accompanied by sympathetic fever, or if the horse be in gross condition, he should be put on bran mashes, and may get a dose of physic. But if he is in a debilitated state, his strength should be kept up by liberal feeding and tonics.

I may mention that, in horse practice, it is important to keep away flies, and remove pain from wounds: iodoform serves both purposes admirably. "Both these objects are at once attained by dressing the wounds with large pads of finely carded, fresh oakum made from new Europe rope, and secured by a carefully applied bandage. The pain-removing properties of such oakum are remarkable; and it is obvious that its use completely excludes flies." (*Dr. R. A. Jamieson*).

Friars' balsam, and oil of turpentine will be found useful for open wounds.

Overreaches

Are wounds, usually, made by the inner edge of the toe of a hind shoe striking the fore foot or leg. The injury is, generally, inflicted just above the heels; although it not unfrequently occurs on the back tendons. It is, especially, liable to happen when the horse is allowed to gallop uncollectedly through heavy ground, or when landing over a fence on to deep soil.

Preventive Measures.—When riding the horse, "keep hold of his head," and do not allow him to "sprawl about." Get the inner edges of the hind shoes, at the toes on the ground surface, bevelled off. Have the hind toes made "square" by getting square-toed shoes, with side clips, put on the hind feet, the toes of which are then rasped flush with the front of the shoes. These precautions in shoeing are particularly necessary for steeplechasers and hunters.

American authorities recommend for trotters that overreach, the use of heavier shoes in front than behind, say, ones of 14 oz. and 6 oz. respectively. Their employment will tend to improve the action, so that ordinary shoes can be resumed later on.

Treatment.—Our chief object in the treatment of wounds just above the heels, is to prevent moisture from getting to the injury, which is on a part, the substance of which is so akin to horn, that the presence of water would tend to cause its decomposition. Remove any jagged ends that may be present, as the fluid resulting from their decomposition would irritate the wound; and apply the carbolic and camphor lotion given on page 74; tincture of myrrh; or tincture of arnica. The alcohol will, on evaporating, leave a resinous covering which will exclude damp; it also stimulates and dries up the cut. If these applications be not at hand, use a little ordinary spirits. Keep the feet dry. When the overreach is on the horny heels "it is necessary to thin the horn below the wound, so as to allow it to expand to the swelling which occurs in the injured parts." (*Fleming.*) If the heels be much bruised, the part should be poulticed.

When the overreach is on the back tendons, it may have been made by the inner edge of the hind shoe, or by the point of the toe, as I have seen in the case of steeplechase horses. When a wound is of this nature, the part should be put into a state of rest by means of a high-heeled shoe; and the horse might get a dose of physic, and be kept on laxative diet. If the skin only be cut, the injury may be treated in the same manner as a sprain of the back tendons. Even when the skin alone is divided, I cannot advise the use of sutures; for the tendon itself can by no possibility have escaped being bruised, although no division of its fibres may be apparent. If, however, a wound has been inflicted on the tendon, as well as on the skin, I would advise that the part should be treated with some antiseptic application (see page 169 to 173), and that water should not be applied to it.

Brushing

Is caused by the outer edge of the inner quarter of a shoe, or, sometimes, by the rough clenches of its nails, wounding the fetlock of the opposite leg.

It may be due to weakness, when, with increased strength, the habit frequently leaves the animal; to fatigue; to defective conformation, especially when the horse "turns out his toes;" to the fact of the outer quarter of the foot being higher than the inner—an arrangement which will cause the fetlock joint to be inclined inwards; &c.

Preventive Measures.—Lowering the crust of the outside quarter of the foot which gets hit will generally serve to remove the fetlock out of the line in which the offending foot moves. This is better than thickening the inside half of the shoe. The part of the shoe which inflicts the injury should be eased off with the file. Lowering the inside quarter of the wall of the foot struck, sometimes succeeds in preventing brushing, and also speedy cutting; such cases, possibly, being those of horses that "turn their toes in." The wall of the foot which inflicts the wound should not be thinned by rasping; for doing so will weaken a part which is intended to bear weight. Lowering the toes of the hoof, and leaving the heels grow down, so as to make the foot more upright, will sometimes prevent brushing. With this object in view, the horse may have to be shod, or his shoes removed, once every three weeks. Horses will rarely brush, if shod *à la* Charlier. The American practice is to use a shoe, the web of which is broader on its outside half than on its inner half, so as to put more weight on the outside than on the inside of the foot.

If these measures do not succeed, a boot or a thick india-rubber ring should be worn. A guard may be made with a piece of woollen cloth about a foot broad, with which a few turns are taken round the fetlock and leg, care being observed to keep all the turns on the same level. A piece of tape is now tied round the leg just above the fetlock and at the centre of the bandage, the upper part of which is then turned over the lower half, so as to form an efficient boot. This should only be a temporary measure; as the pressure of the tape, if continued, will be apt to leave a mark on the hair.

Treatment.—In slight cases, the application of some antiseptic dressing (see page 169 to 173) will be sufficient; but if the wound be inflicted on a previous "brush," the part should be poulticed until the scab comes off, and then treated with an antiseptic. The same course should be observed when there is much inflammation present.

Speedy Cutting

Is, correctly speaking, the act done by the horse when he wounds the inside of one fore-leg near the knee by the other fore-foot. I have known horses speedy cut on both hind legs just below the hocks. Some make a compromise between brushing and speedy cutting by hitting themselves on the side of the cannon bone midway between the knee and the fetlock.

The seat of the injury is, generally, a little below the knee, although it may be just above it on the internal lateral prominence of the lower extremity of the bone of the fore-arm, the radius. These lateral processes are very prominent in high-bred horses. Their office is to afford attachment to the lateral ligaments of the knee joint. Speedy cutting is essentially an injury peculiar to well-bred animals with high action. The wound is usually inflicted at the gallop, or when the horse is dancing about from restlessness. I have observed that horses which turn their toes out, are prone to speedy cutting as well as to brushing (see remarks under that heading). I have seen a case in which the liability to speedy cutting was due to a "knock-kneed" condition of the affected limb, which, naturally, brought it into the line of action of the opposite foot. As the toes were not turned out, I had no remedy to suggest, except that the animal should not be used at fast paces. Horses, as a rule, do not speedy cut, in the gallop, until they begin to tire.

Before purchasing a horse which one may require for fast work, one should examine its legs to see if there be the marks of old speedy cuts, and also whether there be any signs—as, for instance, the hair being rubbed—of the animal having worn a speedy cutting boot. A bony deposit of more or less extent will often be found on and around the spot at which a previous speedy cut has occurred.

The preventive measures are of a nature similar to those for brushing. Here, too, the Charlier system of shoeing seems to act equally well. Sometimes, removing the shoes and adjusting the "bearing" surface every three weeks will prevent this injury.

Young horses that speedy cut may subsequently abandon the habit as they grow older and stronger.

Symptoms.—Heat, swelling, with more or less fever and pain. In two or three days an abscess may appear, or the part may be wounded rather than bruised, and matter (pus) be formed.

Treatment.—If matter be present, a free vent should be given to it by the knife, the part bathed and afterwards treated with an antiseptic (see pages 169 to 173). In any case, give at first a purgative; keep the animal on laxative food (unless he is in a debilitated state); and foment the part with warm water repeatedly before opening. If, after some days, when all heat and inflammation have ceased, we find that the swelling feels as if it contained fluid, we should open it by a horizontal incision at its lowest point—so as to allow the hair to grow over the subsequent scar—then apply an antiseptic, and bandage moderately tightly, so as to induce absorption by pressure. Sometimes, even after the sac is opened, it becomes hard from the exudation becoming organised. In order to cause the breaking up of this deposit, we may determine an increased supply of blood to the part by repeated blisters with biniodide of mercury. A seton is not admissible, as it is liable to thicken the skin and thus leave a blemish.

Broken Knees

Is the term applied to any wound inflicted on a horse's knee or knees by falling, or by hitting himself.

In examining a horse to see if he has been "down," we should, in doubtful cases, closely view the knee in profile, so as to detect any existing roughness of the hair on any particular spot on the front of the joint, by which it may be perceived that the horse has broken his knees on some former occasion; for, unless the edges of a wound unite with a degree of accuracy which we cannot expect to find after this accident, the hair will not lie perfectly smooth and level. The skin should be examined for the scars of former wounds.

Anatomy.—On taking a front view of the knee of the horse--which part corresponds to the human wrist—we find that it is composed of two rows of bones, three in each row, and that they form three distinct joints, viz., one between the radius or bone of the fore arm and the upper row; a second between the latter and the lower row, which forms a third joint with the heads of the cannon and splint bones. There is most motion in the upper joint. The lower one possesses the least power of movement; on which account, in a case of broken knees, the injury usually is inflicted on the upper joint, seldom on the middle, and very rarely on the lower one. Besides the six bones I have mentioned, there is a seventh bone, the trapezium, placed at the back of the upper row of bones to serve as a lever-like attachment for the tendons of the muscles which flex the knee. Occasionally, we meet with an eighth and very small bone—the pisiform—at the back of the lower row.

In well-bred horses, the trapezium is often very prominent, which is a most desirable "point." This conformation may give the animal, to inexperienced eyes, a false appearance of being "tied in below the knee."

Over the front of the knee passes the broad, flat tendon of the muscle (extensor metacarpi magnus) which extends that joint; while between this tendon and the bones of the knee, in order to prevent friction, are placed two bursæ or sacs, which contain synovia (joint oil), and which partly cover the tendon externally; and hence are liable to be wounded when the tendon is laid bare by the animal "coming down." On the outside front, if I may use the term, passes the tendon of the muscle (extensor pedis) which, as its name implies, serves to extend the foot. There is also a small oblique extensor tendon which passes across the knee; and the skin, with its loose underlying tissue, finally, covers the whole part.

The tendon of the extensor pedis, except in extremely grave cases, is, on account of its side position, hardly ever laid bare or injured.

Treatment.—The object of our treatment should be to obtain repair with the least possible destruction of tissue, in order to limit the extent of the subsequent blemish as much as practicable, and to obviate the danger of the wound extending into the joint. Hence, strict antiseptic measures (see page 169) should be adopted. Poulticing or continued fomentations should on no account be employed to the part; as they tend to destroy its vitality, and to encourage suppuration, which, I may remark, is caused by the entrance into the wound of germs contained in air and water. In all cases, we should, by tying the horse up, or by employing a cradle, prevent him from injuring his bad knee. If dirt or grit has entered the wound, they may be removed by bathing the part with warm water for a few minutes; but if there be no foreign bodies in the cut, or if the skin is not divided, the application of water will serve no useful purpose. Considering how difficult it is to keep dressings on the wound without using bandages, which are apt to cause irritation, it is, often, the best plan, in ordinary cases, to give one application of chloride of zinc (see page 173), 40 grains to 1 oz. of water, to be repeated after a couple of days. Or some other antiseptic application (see page 170) may be kept on the part. Above all things, free drainage from the wound should be provided. If this cannot be obtained, and any discharge exists, the wound should be bathed with warm water once or twice a day, to remove the matter, etc., and the antiseptic applied afresh.

"Very often a small piece of dead tissue will be seen presenting a deadened, white appearance in the wound. This should be removed by the curved scissors, otherwise it will act as a foreign body." (*Williams*).

If the animal has to be kept standing for a long time, slings should be employed. He should on no account get his freedom, until there is not the slightest probability of the skin cracking in the event of his bending the leg.

If the wound be sufficiently serious to warrant the fear of open joint occurring, especially, if the animal is restless, he should be at once put into slings, and we may adopt Professor Williams' system of rubbing in strong cantharides blistering ointment below and on both sides of the wound and to the back of the knee, so that all movement in the part may be prevented. Of course, none of the blistering ointment should touch the wound itself; nor should it be rubbed on the skin above the wound; for it might then "run" on to the exposed tissues and cause great irritation.

"The blister acts by removing pain, limiting motion, exciting the formation of healthy granulations, and (as a result of the swelling it produces) causing the approximation of the surfaces of the wound." (*Williams.*)

As soon as the effect of the blister has begun to subside, another may be rubbed in.

If the tendon gets crushed instead of being cut, the crushed part may slough out after four or five days, and will leave the joint exposed. Whether this occurs by sloughing, or by laceration of the tendon, there is, then, great danger to the life of the patient. Even if he recovers, he will have a permanently stiff knee joint. If the injury be complicated by fracture of one or more bones of the knee, recovery may be regarded as nearly hopeless.

It sometimes happens that in a case of broken knees, the skin of the lower edge of the wound has been rumpled back by the horse sliding forward on his knees, when on the ground, at the time of the accident, and a sac has been thus formed into which dirt has entered. In this case, the sac should be probed, and, at its lowest point, a horizontal orifice—so that the subsequent scar may be concealed by the hair—should be made with the knife to allow of dirt, etc., working out.

Occasionally, this sac is not apparent for some days. It will, then, be found soft to the touch, and full of matter when it is opened—as it should be—at its lowest point. In such cases, the little finger may generally, with advantage, be substituted for the probe.

In ordinary rough practice, the edges of the wound should not be brought together by stitches; for the horse will be very apt to tear them out by prematurely bending his knee, and would, thus, cause a serious blemish. Although it is not according to the usual veterinary routine; still I see no reason, especially in the case of a valuable animal kept for show, against applying stitches to a wound of the knee that would, in other parts of the body, demand their employment. If they be used, a suitable splint should be applied to the back of the limb, from a little below the elbow, to the fetlock, in order to prevent movement of the affected joint. The splint should be arranged, so that it will cause no irritation, and that the bandages will not interfere with the circulation. The wound should, of course, be treated antiseptically (see page 169).

The wound should not be poulticed nor fomented for any continued time; for either proceeding will tend to destroy the vitality of the part. It should not be probed except when a sac is formed—and then the instrument should be kept well away from the joint—because, in pushing the probe about, there is the greatest danger of seriously increasing the injury, owing to the tendon and joint being so close to the surface. It is safest for the amateur not to apply bandages to the limb, as their use tends to cause congestion of the blood-vessels and consequent diminution of material brought by them for repair of the wounded surfaces. At first, there is often the appearance of a good deal of so-called proud flesh, which is merely a swollen condition of the wounded tissues caused by the inflammation, and which will abate, of its own accord, as soon as the inflammation subsides. On this account, we should avoid irritating the inflamed parts by the application of caustics, which should be reserved to stimulate the wound, if necessary, to healthy action after the inflammation has abated; we may then use the nitrate of silver.

If the injury be severe, a dose of aloes may be given with advantage. In all cases, the food, at first, should be of a laxative nature. After the symptomatic fever has passed off, the animal's strength should be kept up by fairly liberal feeding.

Kerosene or paraffine oil, or a mild blister, may be subsequently used to stimulate the growth of hair.

Open Joint

Is one of the most serious accidents which can happen to a horse; for he is very apt to die from the ensuing constitutional disturbance. Even if he recovers, there is a strong probability that he will have a permanently stiff joint.

This injury usually occurs on the knee or hock, and is generally caused by falls, kicks, or by inexperienced persons probing about an articulation which has been hurt. No unnecessary probing should be allowed on any account; for the smallest wound near a joint, if it causes the admission of air to the articulation, may be fraught with the gravest consequences.

Symptoms.—There is usually a flow of synovia (joint oil) from the part; though this may take place from wounded synovial sacs without the joint having been penetrated. The discharge becomes more and more unhealthy, until, at last, it becomes mixed with matter and blood, and assumes a fœtid odour. If it tinges a silver probe black, we may feel assured that the bones are affected. After two or three days, the joint swells and becomes very painful, and high fever sets in. In unfavourable cases, the animal dies from exhaustion. If he survives, the joint may become destroyed by union of its bones, which is produced by the conversion into bone of the watery fluid exuded by the blood-vessels, as a result of inflammation.

Treatment.—The intense pain, fever, and, if the animal lives long enough, subsequent union of the bones which form the involved. joint, are due, in unfavourable cases, to the inflammation being extremely aggravated by the entrance into the wound of putrefactive germs which float about in the atmosphere. In order to destroy the germs which may have already settled on the wounded surface, and to stop the future ingress of others, we may syringe into the wound, a few times, a solution of some appropriate antiseptic (see page 170); taking care that it is not too strong.

The wound should be protected by several layers of antiseptic lint, which may be procured from any chemist. If pus (matter) soaks through, the dressings should be removed; an antiseptic applied; and fresh coverings put on; for, if the pus be allowed to form a communication between the wound and the external air, disease germs will quickly work through into the injured joint.

If the part continues to be very hot and painful, we may apply a cantharides blister round the opening.

At first, it is generally advisable to give a dose of physic (aloes or linseed oil), and, if there be high fever, 10 drops of Fleming's tincture of aconite in a pint of water. This drench may be repeated after an interval of three or four hours. If there be great pain, give, instead of the aconite, 3 drachms of opium, or 5 ozs. of laudanum. The opiate may be repeated. Laxative food, such as bran mashes, carrots, etc., should be given. When the fever has abated, the strength may be supported by corn, skimmed milk and water, beer, etc. If, in the first instance, the shock to the system has been great; liberal diet, and stimulants, such as half-a-gallon of beer or half-a-bottle of spirits, mixed with water, should be administered through the day. Slings, if obtainable, should be employed, so as to enable the animal to give the affected limb as much rest as possible, and to prevent him from lying down.

Punctures from Thorns, etc.

These accidents are most common about the fetlock, knee, and forearm. When inflicted on the last mentioned part, they are apt to give rise to serious consequences, owing to the tendency the matter has, on forming, to burrow down towards the knee, by reason of the tendinous nature of the muscles of the forearm. If a thorn deeply penetrates the skin close to a joint, it is advisable, when it cannot be removed without cutting down upon it, to shave the hair and to blister the spot. The seriousness of the injury may generally be guessed at, by observing the extent of the ensuing lameness. The blister, by preventing motion, will obviate the danger of the thorn working further in. It will tend to prevent the entrance of air, and, consequently, the risk of open joint; and, by softening the skin, it will allow the thorn or other foreign body to work out. Poultices may be used when the puncture is at a distance from a joint. Much harm is often done by searching for thorns, etc., with the knife. Capped knee and capped fetlock are sometimes caused by thorns penetrating the synovial sacs of these joints.

Abscess.

The treating of abscess in this chapter is not altogether correct; but is done for the sake of convenience.

Definition.—An abscess is a collection of pus (matter) enclosed within some portion of the body.

Causes.—The chief causes are: injury, as in fistulous withers, quittor and poll evil; irritation from a foreign body; blood poisoning; and fever, as in strangles.

Varieties.—Abscesses may be divided into two kinds: *acute*, in which inflammation is actively and manifestly at work; and *chronic*, in which the process of the formation of pus proceeds slowly and without marked symptoms of heat and tenderness, as we may note in "bastard strangles."

Progress.—The implicated tissue softens; the pus becomes circumscribed in a sac, or diffused. In the former case, pressure, with the production of pus, increases, naturally, in the line of least resistance; destroys the vitality of the structures upon which it acts; and gives rise to the characteristic pointing. In the latter,the pus spreads indefinitely, until it gains exit, or until it meets some effective barrier. An abscess may become checked in its development, may dry up, and become, more or less, absorbed.

Symptoms.—The local symptoms of an acute abscess are tenderness, swelling, heat, throbbing, and "pointing." When pus has formed, the part which was harder than usual before, will become soft to the touch, and may "pit." The presence of a chronic abscess may become apparent by the swelling and fluctuation of its contents. An abscess, especially, if it be a large one, may give rise to feverish symptoms, with depression and loss of appetite.

Treatment.—As the presence of pus favours the destruction of tissue, and may set up blood poisoning, it is advisable, as soon as we find pus, to remove it; to render the cavity healthy; and to encourage the wound to heal quickly. We may open the abscess with the knife, and carefully syringe out every particle of pus. We may then inject into the cavity a watery solution of Jeyes' fluid (1 to 20), peroxide of hydrogen (1 to 12), corrosive sublimate (5 grains to the pint), or a quantity of ether, containing as much iodoform as it will dissolve. When practicable, the opening of the wound should be protected by a thick covering of antiseptic cotton wool and gutta-percha tissue (both of which can be obtained at any chemist's shop), so as to exclude putrefactive germs.

It is interesting to mention that in human practice the pus may be drawn off with an aspirator, and the cavity washed out by means of an attached Allen surgical pump (which may be obtained from Hilliard & Sons, Glasgow), as advised by Dr. Wile, U. S. A. The following is Dr. Wile's procedure :—" I then take a 20 volume solution of peroxide of hydrogen. To this I add an equal volume of water, and, by reversing the motion of the handle of the pump, without withdrawing the needle, I inject the cavity till it is moderately distended only. Almost immediately I find that the distension becomes greater and greater, until I am satisfied that the medicament has reached every nook and corner. Then I simply turn the pressure off from the rolls of the instrument at the back of the pump, the accumulated gas which has been given off rushes out through the tube, carrying with it a considerable quantity of *débris*. I tighten the rolls again, and, continuing the motion of the instrument in the same direction, I extract every particle that is left, and repeat the procedure as before. At the second washing with the peroxide I notice that I do not get nearly so much distention, and when the screw at the back is loosened for the second time, but little of the gas and fluid come away. After this comes off I am sure that I have a perfectly clean cavity. Now I take a solution of bichloride, 1 to 2,500, and again inject and withdraw two or three times. I am then confident that I have a perfectly aseptic cavity. At this stage the needle is removed, and I place over the whole integument overlying the abscess a smooth, even pad of iodoform gauze. I bind it firmly and neatly in place by an abundance of bichloride gauze bandage.

"This dressing I invariably leave in place from four to ten days, when I always find complete closure of the cavity, perfect adhesion of its walls, and not a trace of the abscess left. The patients are simply delighted that no knife is used, and but very little pain produced."

Saddle and Harness Galls, and Inflamed Withers.

The saddle should take a level bearing on each side of the back, and should put no pressure whatsoever on the spines of the vertebræ ; as these bony processes are unfitted to bear it. The parts of the back which are most liable to be injured by the saddle, are the withers and the spot just behind the cantle.

As a rule, the withers become galled by the downward pressure of the gullet plate; by lateral pressure, when the arch of the gullet plate is too narrow, or when it becomes blocked up by, for instance, too thick a numdah; or by the side play of an ill-fitting side saddle, especially at the trot, or by the lady using too long a stirrup, in which case the injury will usually be inflicted on the off side of the withers. In order that a side saddle may fit properly, the distance apart of the points of the tree should accurately correspond to the thickness of the horse, so as to diminish, as much as possible, the side play, which is almost inseparable from side saddle riding. Particularly with men, the use of too short a saddle is a not unfrequent cause of sore back, just behind the cantle, upon which weight is unduly thrown. If the horse be made to go fast or to jump, the skin immediately behind the cantle being pressed downwards and backwards, will become forcibly wrinkled at each stride the animal takes; the natural result being that inflammation is set up, and a tumour appears. A repetition or two of this process increases the evil; matter is formed; the warble suppurates, and the horse is laid up for a month or more. I have seen so many cases of sitfasts having been produced by saddles which were not long enough for their riders, even after they had been stuffed and re-stuffed, that I am confident I am correct in laying the blame on the shortness of the tree, in the majority of cases of saddle galls behind the cantle. I may mention that the length of the saddle should principally depend on the length of thigh of the horseman. The use of imperfectly stuffed rollers is a frequent cause of sore withers.

Horses with high withers are specially liable to this accident. If it be inconvenient to have the pannel properly stuffed, a pad may be made as follows:—Take six or eight pieces of felt, each being about four inches broad and six or seven inches long. Arrange them so as to form two pads of equal thickness, about four inches apart, on a piece of serge thirteen or fourteen inches broad and seven or eight inches long; over the whole place a similar piece of serge, and sew them together so as to form one pad, the centre and thin part of which will lie over the withers, while the padded sides will raise up the pommel. A folded handkerchief or towel placed on the withers is of little use; for it simply prevents them being cut by the iron gullet-plate, but does not relieve them from pressure.

When saddle-cloths or *numdahs* are used, the groom, before girthing up the horse, should, with his finger, raise the cloth well up into the gullet, so that it may not press tightly down on the withers. At the same time, care must be taken that the numdah is not so thick as to fill up the gullet-plate, and thus pinch the withers at each side of the gullet-plate.

As a temporary measure, in a case of sore withers, strips of felt about four inches broad and eight or nine inches long, may be sewn on to the pannel of the saddle, in order to keep the gullet-plate from hurting the injured part. The pieces of felt should be placed well down on each side, so as to allow a free current of air to play over the withers. This is a much better plan than that of using a thick felt saddle-cloth.

After a case of sore withers, or sore back, a horse will often flinch for months, or even years, on the part being suddenly touched. If the flinching be simply due to the remembrance of former pain, the animal will allow the part to be handled, if the operator commences by gently rubbing the skin at some distance off, and, then, gradually "works up" to it. In this manner a horse often contracts the habit of "crouching down" for a minute or two after being mounted. Memory appears to be the predominant faculty in the mind of this animal.

Some riders are very apt to give horses sore backs by the unworkmanlike practice they affect, when riding, of sitting far back on the cantle of the saddle, and of sticking their toes out in front of the horse's shoulders; the consequence being that the weight is thrown on the cantle at every stride, instead of on the centre of the saddle. The knee joints of a rider, with a proper seat, give and take to the motion of the horse, so that there is no bumping up or down. Not unfrequently with horses ridden by ladies, the withers and part just under the cantle—as a rule, on the off side—get rubbed on account of the saddle being inclined to wobble from too much stuffing. I may mention, that however "square" a lady's seat may be, it is impossible for her, at all times, to avoid giving some side play to the saddle; hence the great necessity of having her saddle accurately fitted.

The stuffing and lining of the saddle should be attended to. The pannel is apt to get hard from the absorption of perspiration, and should be dried, beaten, and brushed, as required. A saddle cloth will form a useful protection. Leather saddle-cloths, which should be a little larger than the pannel, are excellent for preventing sore backs. If constantly used, they do not require any dressing, as the oily matter of the sweat will keep them soft. Leather may be used with advantage, instead of serge or flannel to cover the pannel, the stuffing of which, if expense be no very great object, had best be of horse hair; as this substance preserves its elasticity, and does not easily cake.

If a horse be thoroughly and quickly dried underneath the saddle on returning from work, no harm will result from the gear being removed while the animal is still warm; but if the rubbing down be neglected, the result may be a "warble," which is the name given by grooms to a tumour formed in the manner described.

If it be not convenient to groom without delay a horse which returns hot from a ride, the girths should be loosened and the saddle should not be taken off for, at least, twenty minutes, during which time it would be all the better to walk the horse about.

In ordinary saddle work, the girths often cut a horse, from the person saddling the animal neglecting, on girthing up, to pass his finger between the girth and the skin, so as to smooth out the wrinkles. Girths of raw hide or of cord, which allow of ventilation, are often useful for avoiding galls. The Fitzwilliam, which consists of a broad girth attached to two buckles at each side with a narrow one over it, is, I have found, the girth which is least liable to gall a horse. If the skin is very tender, a piece of lambskin may with advantage, be sewed round the girth, with the wool towards the sensitive part.

It almost goes without saying that young horses put into work for the first time, or animals that have had a long spell of idleness, are, when ridden or driven, much more liable to saddle or harness galls, than those that are in regular exercise. A "heated" state of the system, naturally, predisposes a horse to be rubbed.

Treatment.—If the bruise be but slight, cold applications may be sufficient to reduce the inflammation and swelling. But if this desirable result be not obtained, we may blister the part with the biniodide of mercury ointment, in order to prevent the matter from burrowing down.

When matter has formed, which fact may be known by the tumour becoming soft to the touch, the abscess should be opened with a knife; the best being Symes' abscess knife.

Vent should be given to the pus, every drop of which should be syringed out, and the part treated as directed for abscess on page 194. I have found a solution in ether of as much iodoform as it will take up, to be an admirable application in these cases.

If matter has already formed, the abscess should be opened with the knife and treated as before described; or a seton, smeared with the biniodide of mercury ointment, may be passed through the lowest point of the abscess; at which, in all cases, if possible, an opening should be made for the escape of matter. If the part around the wound continues swollen, it may be blistered with biniodide of mercury ointment, once or twice.

If the bones of the vertebræ become involved, they should be cut down upon, and the dead or diseased portion removed.

Blisters applied around the abscess are particularly useful for stimulating the part to healthy action.

Give a dose of physic, and keep the animal on laxative food.

Care should be taken that the animal is not allowed to rub his sore withers against the frame-work of his stall.

The horse should not be used for saddle work until the swelling has entirely subsided, and the wound healed. For some time after that, a solution of alum and water, or salt and water, may be applied to the part to harden it, which might also be done to the shoulders of horses that are put into harness for the first time, or after a period of idleness. The stuffing of the saddle should be carefully attended to.

Neglected suppurating warbles are apt to take on an angry, unhealthy-looking appearance, having a hard, leathery margin round their circumference; they are then called *sitfasts*. The hard, dead skin that surrounds the sore, being a foreign body, must be removed, which may be done by continued poulticing. If this treatment does not succeed, cast the horse and remove every particle of the hard skin with the knife, and treat the sore with an antiseptic application (see pages 169 to 173) like an ordinary wound.

If a piece of skin be left in the centre of the wound, detached from the remainder of the skin, it should be torn off, or cut out with a knife; for, if this be not done, it will act as a foreign body and keep the wound open. When the connection of small pieces of skin with the remainder of that surface becomes severed, they lose their vitality; probably, on account of their being deprived of the blood supply obtained from the surrounding skin. We may see this happen when cross lines are deeply burned into the skin during the operation of firing, so as to form diamond-shaped marks.

I need hardly say that as long the horse's back continues sore he should not be worked.

Whenever a scab becomes bruised or hurt, it should be poulticed until it falls off, so as to give free vent to any new matter that may form. After that, the wound may be treated with some antiseptic.

Poll Evil

Is similar in its nature to fistulous withers. It consists of an abscess or abscesses which form immediately behind the ears of the horse, as the result of blows, or, according to Professor Williams, from the continued use of a tight bearing-rein. Mr. Percivall states that it is often caused by the cart-horse rubbing his poll against any convenient object, when suffering from irritation due to the wearing of hard, heavy, and ill-fitting head-collars.

Poll evil is frequently found among farm horses that have to get their food, as best they can, on short pastures. As there are many instances of several animals, under these conditions, and on the same farm, having become affected about the same time, the supposition of all of them receiving blows on the poll, without the owner's knowledge, is untenable. It is probable, as pointed out to me by Mr. Page Wallis, M.R.C.V.S., Cambridge, that, in such cases, the disease is induced by the animal being obliged to keep its head in a lowered position, for a considerable time each day, in search of food. Perhaps the inflammation, here, is owing to continued congestion, caused by gravitation of blood, and aggravated by undue strain on the tendons and ligaments near the seat of injury?

Treatment.—If matter has not formed, blister the part; but if the tumour be "ripe," open it and treat as for abscess (see page 194). A seton will, generally, act well. Feed from a raised manger and not from the ground. Horses with poll evil should not be turned out to grass; for retaining the head for a long time in a low position would seriously interfere with the animal's chance of recovery.

Burns and Scalds.

Treatment.—If blisters have formed, puncture them with a needle to let out the fluid. Apply iodoform freely over the part, which may, then, be covered with cotton wool (the absorbent kind, which can be got at a chemist's, for choice), or lint or cotton-wool may be smeared over with iodoform ointment (see page 172), which is the better preparation, or Carron oil (see page 518), and then applied. If these be not available, use olive, or any other sweet oil; or dust the wound over with fine flour, or cover with cotton wool, in order to keep out the air.

If the injured parts begin to separate from the healthy tissues, apply poultices and treat as an ordinary wound. If the pain be great, give 3 drachms of opium in a ball, or 4 ozs. of laudanum, in a pint of water, as a drench, and keep up the strength by a quart of beer, or a couple of glasses of spirits mixed with water, every now and then. A severe burn or scald causes great shock to the system; hence the necessity for supporting the vital powers after these accidents.

Wounds of the Abdomen

May consist of simple injury to the skin and superficial muscles; or of an opening into the abdominal cavity; an accident which may, very probably, be accompanied with, or followed by protrusion or puncture of the intestines and inflammation of the peritoneum—the membrane which lines the abdomen and covers the bowels. Cases which come under the first heading, may be treated as simple wounds, while precautions should be taken to prevent matter (pus) working down through the underlying structures, and to allow it free exit. In the graver cases, a large dose of opium, say, $\frac{3}{4}$ oz., may be given in order to arrest the action of the intestines, as their movement might give rise to peritonitis (inflammation of the peritoneum), or seriously aggravate it, if already existing. Opium has a special power for checking the motion of the intestines. In order to nullify the action of the putrefactive germs which are contained in the air, a solution of 1 part of Jeyes' fluid to 40 of water may be freely applied to the part, and introduced into the wound by means of a sponge and stick, or other suitable arrangement. Ready escape for matter should be provided, the knife being used if necessary. The abdomen should be carefully bound round with a sheet, and means for reducing the protrusion of the intestines should be adopted, as the case may require. In order to keep up the strength, while giving the bowels the least possible amount of work to do, food in a concentrated form should be given, such as skimmed milk with the yolks of hard-boiled eggs mashed up in it, oatmeal gruel, etc. Boiled barley and a linseed-mash, now and then, may also be of use. If constipation ensues, a little linseed oil, say, a quarter of a pint, may be mixed through the food three times a day. As peritonitis is an extremely fatal disease, our efforts should be directed to prevent its occurrence, and, if it sets in, to mitigate its effects. We should also take proper precautions to prevent matter from burrowing down and forming abscesses.

Symptoms of Peritonitis are: a very frequent, wiry pulse; great depression; pain; disinclination to move; coldness of the legs and ears; and hurried breathing. Up to the last, the lungs seem to act well; but the heart appears to be unable to supply them with blood. In fatal cases the animal dies after a few hours' suffering.

Peritonitis as a Result of Castration.

As a portion of the peritoneum (see preceding section) covers the testicles, it becomes wounded during castration; and inflammation of its surface may ensue a few days after this operation has been performed. The symptoms are similar to those described under the heading "Wounds of the Abdomen" (see page 205). Though treatment appears to be of little avail, still we may try the effect of a large dose of opium, and fomenting the abdomen by enveloping it in rugs wrung out of hot water. The scrotum may be frequently bathed with warm water.

Bleeding after Castration.

Owing to weakness of the walls of the blood-vessels, unusual size of the artery, unskilful manipulation, or other causes, serious bleeding may occur after castration. It may be stopped by getting hold of the end of the severed cord and ligaturing the artery, or again dividing the cord, higher up, with the écraseur. If this be not possible, we may plug the scrotum well up, on both sides, with fine tow. Pounded ice or very cold water may, then, be applied to the part. The tow may be removed after a few hours. Some practitioners recommend that an enema or two of water, as cold as possible, should be given; while others advise that a lump of ice should be placed within the scrotum. When the plugging "has not checked the bleeding, we have applied a folded horse-rug, saturated with cold water, across the loins for a few minutes. This acts as if by magic." (*Fleming.*)

Scirrhous Cord

Is a tumour growing on the end of the cord from which the testicle has been removed. It is, usually, supposed to be due to irritation caused by the cord, at the time of castration, having been left too long and, consequently, having become pinched on the wound healing; by the cord adhering to the scrotum; by a scale of iron being left after the hot iron; or by a portion of caustic, when caustic clams have been employed.

This growth may not be apparent for even years after castration, though the scar made in the scrotum continues to have, during that time, a peculiarly pursed-up appearance. These tumours occasionally grow so large that they interfere with the horse's movements.

Its removal is effected in the same manner, and is not attended with greater danger, than is that of the testicles during castration; the only difference being that, when operating for scirrhous cord, the skin of the scrotum and the underlying coverings should, first of all, be dissected away. No time should be lost in getting it removed. The preventive measures are careful breaking down, with the finger, of the adhesions between the cord and the scrotum, once or twice, within a week or ten days after castration.

In looking at a gelding with a view to purchase, it is good practice to pass the hand over the scrotum, so as to find out if the parts be free from all hardness; for that condition would indicate the probable existence of scirrhous cord, which is a serious unsoundness.

It seems probable that this affection, which, sometimes, recurs after removal, is not unfrequently caused by unnecessary pulling at the cord while the horse is being castrated.

The presence of scirrhous cord may be manifested by lameness behind, and by the animal throwing out and dragging one hind leg. The horse should be examined *per rectum*, as well as externally; for the growth may extend into the abdomen.

The tumour should be dissected away from the scrotum as high up as possible; the adhesions being broken down, as far as practicable, with the fingers. The growth can then be removed by the écraseur. To give a fair prospect of recovery, the cord should be divided where it is perfectly sound, and free from any abnormal thickening.

Inflammation of the Jugular Vein from Wound.

The chief causes which induce inflammation in that portion of the jugular vein which has been wounded by the fleam or lancet, during the operation of bleeding, are as follows:—(1) The introduction, into the wound, of decomposing matter, which, when this takes place, is generally obtained from the blade of the instrument; but may, also, be communicated by unhealthy surroundings. (2) Undue irritation, sufficient to set up suppuration; as, for instance, happens, when the part gets rubbed by the animal, soon after the operation. (3) Failing to bring the edges of the wound correctly together. (4) A bad condition of the animal's system, which will prevent the wound readily healing.

A clot forms in the vein, with or without abscesses along its course, and extends towards the head. "The lips of the wound are separated, everted, are redder than natural, and discharge a sanious material, mingled with blood; the surrounding parts, also, are in a state of tumefaction and tension, whilst the vein, in its course towards the head, conveys the sensation to the fingers of a hard cord of considerable thickness." (*Williams.*)

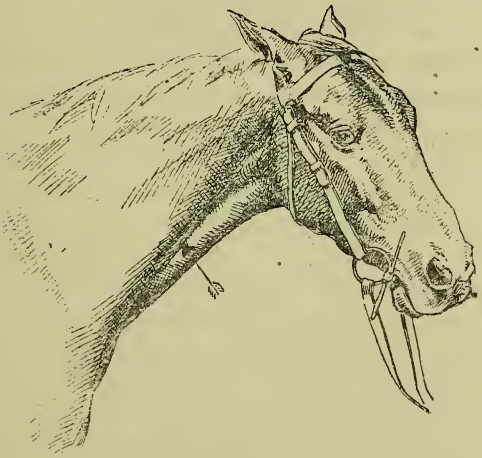


Fig. 19.

Treatment.—Rub in "a smart cantharides blister along the course of the inflamed part, and a cure will be effected in a very short time. The blister is to be applied, whether suppuration be present or otherwise. If abscesses have already formed, they must be opened before the blister is applied." (*Williams.*) The vein becomes permanently blocked up, in all cases; although its circulation is, in part, restored by side branches. A horse thus affected should not be required to feed with his head low down, as that would greatly increase the difficulty the blood already has of making its way to the heart.

We can find out if this vein is in working order by pressing our finger on the jugular groove, at about the spot indicated by the arrow head in Fig. 19. If it be all right, it will be seen to fill with blood, above the finger.

CHAPTER VI.

Herniæ (Ruptures).

A HERNIA may be defined as the protrusion, out of the abdominal cavity, of a portion of the intestines or of their connecting membranes. The part that protrudes through the wall of the abdomen, is usually covered with peritoneum, which is the membrane that lines the cavity, covers the intestines, and forms their connecting membranes.

Hernia at the Navel (umbilical hernia), being situated in the middle line of the abdomen, can scarcely escape the observation of the most inexperienced. The tumour is, usually, " doughy " to the touch, and can be reduced by manipulation. As long as it remains in this condition, we may assume that the peritoneum only is protruding. But, when it is hard and of varying size, we may conclude that a portion of the intestines has escaped from the abdomen.

Treatment.—Unload the intestines by giving a pint of linseed oil and by keeping the animal without food for some hours. Place him on his back, and, having returned the tumour, take up as much loose skin as possible, and pass a darning needle directly over the opening. Wrap several turns of cord between the needle and the abdomen, so that all the enclosed skin will become strangulated, and will, in time, drop off. Sufficient irritation will, thus, be established to cause the closure of the orifice. The cord may, before being used, be smeared over with some caustic, such as corrosive sublimite and lard.

When the hernia occurs in the abdominal wall, but not at the navel, it is called a *ventral hernia*, and may be treated by specially made bandages.

Inguinal Hernia.– Each testicle and its cord are surrounded by a pouch of peritoneum, which descends from the abdomen into the scrotum. The passages thus formed between the abdominal cavity and the interior of the scrotum, are called the *inguinal canals.* Owing to various causes, a portion of the intestine may enter one or other of these canals—an accident which is termed an inguinal hernia. When the bowel descends into the scrotum, it is sometimes distinguished as "scrotal hernia." It occurs more often on the left, than the right side, on account of the folds of the small intestine occupying principally the left flank. Inguinal hernia may be acute or chronic. The former is generally caused by severe exertion, during which the intestines, being pressed together by the abdominal muscles, a portion of the intestines is forced through one of the inguinal canals. The imprisoned part becomes inflamed, and, unless it is released, death usually ensues in less than twenty-four hours. If the application of remedial means be delayed beyond twelve hours, the chances of recovery will be but small. The *symptoms* of an acute attack are collicky pains which gradually increase in intensity. Sometimes, the animal lies on his back; at other times, he may sit on his haunches like a dog. On feeling the testicles, if the horse is entire, the cord will be found harder than usual; and, after some time, a swelling will appear in the scrotum owing to the escape of watery fluid from the inflamed parts. On examining the inguinal canals, by passing one hand into the rectum and applying the other on the outside, the presence of the hernia may be ascertained. Towards the end, gangrene sets in; all pain ceases; and the animal dies in a state of extreme prostration. If an owner suspects that his horse has this form of hernia, he should lose no time in sending for a veterinary surgeon; for, if the bowel is strangulated and the animal is left alone, it will die. Chloroform is of great value in the reduction of these accidents. Chronic inguinal hernia, which is common in countries where stallions are in general use, may continue for years, causing little or no inconvenience to the animal. When entire colts are thus affected, it is usually good practice to defer castration until they are two or three years old; for, not unfrequently, the hernia, by that time, disappears. If it does not do so, the colt may be castrated by the covered operation.

When examining a horse for inguinal hernia which has descended into the scrotum, Mr. Percivall recommends the operator to "grasp the tumour with one or both hands, softly but closely, and then let another person cough the horse, and the swelling will be found suddenly to expand under the effort, and as quickly to recede again." "Coughing a horse" consists in making him cough by compressing, with a finger and thumb, one on each side, his larynx, which lies between the angles of the lower jaw.

As castration causes contraction of the canals, geldings are much less prone to inguinal hernia than are stallions; and mares are nearly exempt.

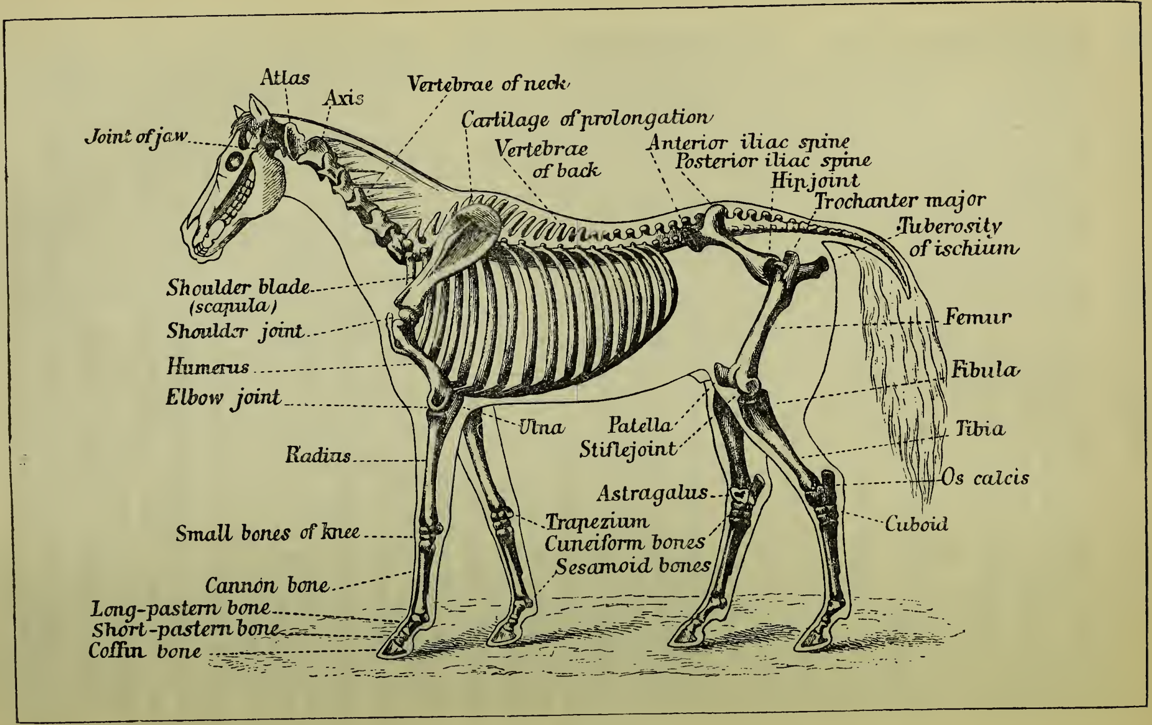

Atlas
Axis
Vertebrae of neck
Joint of jaw
Cartilage of prolongation
Vertebrae of back
Anterior iliac spine
Posterior iliac spine
Hip joint
Trochanter major
Tuberosity of ischium
Shoulder blade (scapula)
Shoulder joint
Humerus
Elbow joint
Ulna
Patella
Stiflejoint
Femur
Fibula
Tibia
Radius
Os calcis
Astragalus
Cuboid
Small bones of knee
Trapezium
Cuneiform bones
Sesamoid bones
Cannon bone
Long-pastern bone
Short-pastern bone
Coffin bone

FIG. 20.

CHAPTER VII.

FRACTURES.

FRACTURES IN GENERAL—VARIETIES OF FRACTURE—METHODS OF UNION—GENERAL SYMPTOMS—GENERAL TREATMENT—ANTERIOR ILIAC SPINE—BACK—CANNON BONE—COFFIN BONE—POINT OF HIP—TUBEROSITY OF THE ISCHIUM—JAW—NAVICULAR BONE—PASTERN BONES—PELVIS—RIBS—SHOULDER BLADE—TAIL—TIBIA—TROCHANTER MAJOR.

Fractures in General.

As fractures of the bones of the horse are, as a rule, but little amenable to treatment, owing to the difficulty of reducing and "setting" them, and of keeping the patient at rest, I shall content myself with describing the comparatively small number of these accidents which may, under ordinary circumstances, be successfully treated.

A fracture may occur straight across the bone; obliquely; or longitudinally (lengthwise).

The chief varieties of fractures are as follows:—

1. *Simple fracture*, when the bone is broken, without an external wound opening to the seat of injury. As the periosteum—the covering membrane of the bone—is, generally, very strong in the horse, it often keeps the broken surfaces together, and thus prevents for the time being, the fracture from becoming apparent.

2. *A compound fracture* occurs when the broken bone communicates with an external wound.

3. When the bone is broken into several pieces, the injury is called a *comminuted fracture*, which may be simple or compound.

4. An *impacted fracture* takes place, when one broken end of bone is driven into the other broken end.

Simple fracture is the only kind which, usually, admits of successful treatment, in veterinary practice.

The *methods by which broken bones unite* are as follows :—

1. Under very favourable circumstances, such as, when the periosteum is but slightly injured, the broken ends may unite by simply becoming glued together by means of the reparative material deposited by the blood-vessels. In order to bring about this desirable termination, we should endeavour to check the inflammation as much as possible, by giving rest, and attending to the general health ; for when the vessels which supply the bone with the elements of repair, become inflamed, the circulation of blood in them is arrested, and they are consequently, unable to repair the injury in a proper manner.

2. When circumstances, or the nature of the part does not admit of the ready union of the bones in the way just described, a desposition of bony material takes place on the outside of the bones at the seat of fracture, so that the broken ends become firmly insheathed ; and if the bone be hollow, a plug of bone is formed within the internal cavity which contains the marrow, so as to still further prevent movement. Rest being thus secured, the broken surfaces become gradually united by the deposition of bony material. When complete union has taken place, and all inflammation and increased reparative action have ceased, the

external and internal bony deposits become absorbed after several months.

3. When continued irritation from movement, ill-health of the animal or other causes prevent the completion of the process of union, it may be arrested at a period when the connection has become established by fibrous material. We would then have a *false joint*. I may remark that the completion of the act would be absorption of this fibrous material, and deposition of bone in the manner already described.

General Symptoms of fracture.—Sudden and great lameness; frequently, deformity of the part, with or without abnormal mobility. Grating (crepitus) may be felt, or even heard when the broken surfaces rub together. Pain and fever. When there is fracture without displacement, there is often very little to show what is wrong as long as the animal is kept quiet. The symptoms, then, are somewhat similar to those of violent sprain. Here, the absence of injury to other parts will generally help us in our investigation. When feeling the part, great care should be taken not to separate the divided ends, if there be no displacement; nor to convert a simple fracture into a compound one, which is by far, more dangerous and more difficult of cure, by reason of the entrance into the wound of putrefactive germs from without; as well as by the increased extent of the injury.

General Treatment of fractures.—If there be displacement, the bones should, if possible, be "set" without delay. If there be compound fracture, the wound should be thoroughly syringed out with some weak antiseptic (see page 170), if the parts be clean; but if they be dirty or bruised, we may use a solution of 40 grains of chloride of zinc to 1 oz. of water (see page 173).

The animal should have perfect rest, slings being employed if they can be obtained, and if the nature of the injury admits of their use. All completely separated fragments of bone should be removed; but those which are only loosened, and which are still retained by periosteum, should be left undisturbed.

Splints may be employed to limit motion in the part, and to give support. They may be made of sole leather, gutta-percha, strong paste-board, or thin wood. Leather will require to be soaked in hot, and gutta-percha in moderately warm water, to make them pliable. Before applying splints, the inequalities, which may be on the surface, should be filled up with tow or cotton-wool, and the splints should be cut so as to prevent them from interfering with any prominences near the part, and, also, to keep exposed, for treatment, any wound which may have been inflicted at the time of the accident. For a broken limb, it is well to use two splints, each being a little less in width than half the circumference of the part. We may, then, apply over the splints an *immovable bandage*, which will afford firm support, and may be easily removed by cutting it through, with a pair of scissors, at the space between the splints, on either side. Owing to the presence of hair on the skin, an immovable bandage, applied as a " charge " (see page 29), may be used instead of splints; or, after it is put on, splints may be adjusted and then kept in position by another immovable bandage. These appliances consist of a coarse cotton bandage, about 3½ inches broad, and of sufficient length for its purpose; while it is rendered firm and secure by the application of some adhesive substance, such as a thick mixture of starch or plaster of Paris and water, paste, " charge " composition (see page 29), omitting the mercurial ointment, or even common pitch. The French recipe is equal parts of pitch and Burgundy pitch, and a quarter of a part of Venice turpentine, to be melted together. Starch, plaster of Paris, and paste are more suitable for bandages over splints, than for those applied on the skin itself. There would be great difficulty in readjusting, if required, a bandage smeared over with common pitch. Care should be taken that the bandage, whatever one is used, is not applied too tightly at first, though, at the same time, it ought to afford firm support. Careful and abundant padding is of the highest importance when arranging splints. Splints or bandages need not be kept on longer than six or seven weeks; after which time, the reparative material will, as a rule, have become sufficiently solid to keep the broken ends together without their aid, although the animal should not be taken out of his stable for another month and a half. As a rule, it would not be safe to begin work sooner than five months after the accident.

My cousin, Dr. R. A. Jamieson, kindly gives me the following notes on this subject :—" Extemporary splints can be made out of almost anything, such as bundles of brushwood, whips, laths, pieces of strong wire, etc. Handfuls of grass, weeds, or leaves can be used for padding; and torn-up handkerchiefs, for bandages. Strong iron wire, or thin tin-plate may be, advantageously, laid between the folds of plaster or glue bandages.

" An excellent immovable apparatus is the so-called 'Bavarian Splint,' introduced into England by Surgeon Moffitt of Netley. Bryant 'has tested it well, employing gum and chalk, instead of plaster of Paris, and can strongly recommend it, being simple, can be applied very quickly, and is most effective.' Mr. Moffitt describes it as follows :—' For the application the following is necessary, viz. : flannel, pins each three inches long, bent to a right angle three-quarters of an inch from the head, fresh plaster of Paris, water either cold or hot, a basin and spoon, a needle and thread, and a roller bandage.

" ' A piece of flannel sufficiently large for the limb to which the splint is to be applied, is doubled and cut of shape and size not only to envelop the limb, but to overlap to the extent of about two inches. The two folds of flannel are then stitched together in a seam, along the centre lengthwise. This done, the limb is laid on the flannel along the seam, and the broken bones being replaced in their natural position, the inner fold of flannel is brought up, and its edges pinned together, along the upper or front part of the limbs, so as to envelop it evenly and tightly. In pinning the edges, the pins should be so inserted that the heads will not be covered by the plaster, otherwise there will be difficulty in withdrawing them when the splint is completed.

" ' The next step is to mix the plaster of Paris with water, using about equal quantities of each. When the mixture thus formed begins to shew signs of setting, it should be turned out of the basin into the angles at each side of the limb, between the two folds of flannel. This done, the plaster is spread with the spoon as evenly as possible, in a layer about half an inch thick, over the inner fold of flannel. The outer fold is then brought up round the limb over the layer of plaster, and its edges being brought together and held tightly in that position, the plaster, thus retained between the two folds of flannel, should be pressed and smoothed with the hand, so as to form a well-fitting case for the limb.

"'When setting of the plaster has taken place, the pins are withdrawn, the edges of the flannel trimmed off, and a roller bandage, or a few straps with buckles applied round the whole.

"'By this method a splint is formed in two parts, hinged to each other by that part of the flannel where the seam is. One side or both can be let down without disturbing the fractured limb, when it is necessary to expose it for dressing a wound, or other purpose.'

"In practice, it will be found necessary to use flannel which has been already shrunk, else the plaster will be liable to crack; and advisable to unite the two folds of flannel by two parallel median seams, a quarter of an inch apart, instead of by one seam. Further, the plaster should be applied as soon as mixed; for if we wait for signs of setting, the process will be far advanced before the interstices of the flannel can be charged, and the splint will fail. The limb should, also, be oiled before the apparatus is applied, else intolerable itching may be induced. When a wound has, also, to be dressed, an excellent plan is to cover it carefully at the moment of applying the splint, so as to avoid soiling the inner surface,and then, when the plaster has set, to cut a window in the splint, corresponding to the wound. This can be done by tracing the aperture required on the outside with a glass rod dipped in a concentrated mineral acid, and following the outline with a sharp knife, a valence of oiled silk, or other impermeable material, is then fastened round the borders of the wound with collodion. Through the opening thus guarded, the wound can be treated, as if no splint were on the limb. Although it may not be absolutely necessary, the application of a thick even layer of cotton wadding between the skin and the inner layer of flannel, before this latter is adapted to the limb, will obviate any risk of undue pressure caused by shrinkage."

Sawdust is a capital material for bedding in these cases; as it affords good foothold, and allows the animal to readily change the position of his limbs. A mild aperient, such as a pint of linseed oil, and laxative food, will be of service. The broken bone will, often, not unite until the animal gets a change of food and plenty of green-meat. If he suffers from great pain, in the first instance, we may give 2 or 3 drachms of opium, or 3 or 4 ounces of laudanum. If, after union has taken place, there remains a large deposit of bony material which was thrown out for the repair of the injury, the part may be blistered two or three times with biniodide of mercury, or deeply fired with a pointed iron at different places.

Particular Fractures.

The most common fractures are those of the point of the hip, the pastern bones, and the tibia (the bone which lies between the hock and the stifle).

Anterior Iliac Spine.—See "Hip, point of."

Back.—By the term "*broken back*" is meant fracture of one of the vertebræ of the loins or back. The former accident is almost always fatal; although recovery after the latter, not very unusually, occurs on account of the support afforded by the ribs keeping the divided ends together. If the resulting paralysis be but slight, there is every hope that the case will do well; but if the loss of muscular power be complete, recovery will be out of the question. If, after a horse has had a fall, there be reason to believe that he has broken his back without displacement of the fractured ends, he should be kept lying down, if already on the ground, or, if he has regained his legs, he may be put in slings, so as to prevent him getting down; for displacement will destroy every chance of saving him. It would be better to tie the horse up, if he can stand without support, than to put him in slings; for, by bearing his weight on them, he might be apt to "roach" his back, and thus separate the broken ends. A blister rubbed over the suspected part might prevent the animal from moving it. Except in obviously fatal cases, it is difficult to distinguish between this accident and severe sprain of the psoæ muscles. (See page 45.) Azoturia is, sometimes, mistaken for broken back by inexperienced persons; although the dark-brown colour of the urine, in cases of the former, should readily serve to distinguish it.

Broken back generally occurs from falls, or from the practice of tying horses tightly up after casting them (see page 544).

Cannon bone.—If there is displacement, the ends of the bone should be brought into position without delay, and splints and bandages applied.

Coffin bone.—See page 123.

Hip, point of.—Fracture of this part (anterior iliac spine, see Figs. 20 and 21) is, perhaps, the most common of all these injuries to the horse. It not unfrequently occurs on account of the animal hitting himself when passing through a narrow gateway, or by falls. When this fracture takes place, it is very difficult for the broken point of bone to obtain rest;

because, some of the abdominal muscles which are

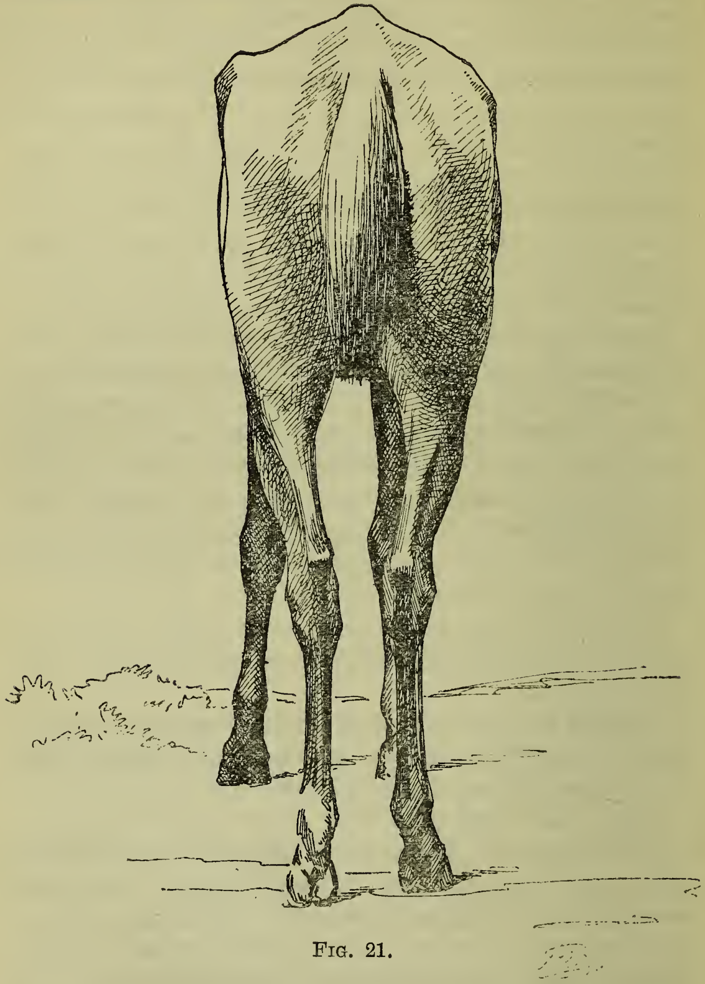


Fig. 21.

attached to it, alternately contract and become relaxed during each act of breathing. Hence, a false joint is the usual method of repair. I have, however, seen dissections of cases in which the detached portion of bone overlapped the adjoining part of the pelvis, and became firmly fixed to it by bony union. If the disconnected portion of bone does not become united it should be cut down upon and removed; for, if allowed to remain, it will act as a foreign body in giving rise to inflammation. Although this accident causes an unsightly blemish, in rendering the affected side flatter than its fellow (see Fig. 21), it does not, as a rule, materially affect the animal's usefulness; and, even at first, often causes little or no lameness.

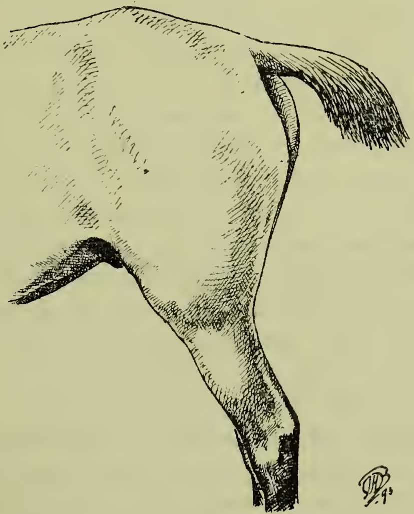


FIG. 22.

Ischium, tuberosity of the.—This portion of the pelvis is the rearmost bony projection of the hindquarters. The two tuberosities, one on each side, form the channel which exists just below the root of the tail. When this fracture occurs, the part looks unnaturally flat and straight on viewing it sideways (see Fig. 22, which shows fracture on the near side). The existence of pain, swelling, and lameness will, also, indicate the seat of injury. A good recovery may be expected, if a long rest be given.

Jaw.—The lower jaw is, sometimes, chipped by the injudicious use of severe bits and tight curb chains. Any detached portions of bone which may be present, should be removed; and any diseased parts, scraped off and touched with hydrochloric acid. An antiseptic (see pages 169-173) should be applied, a few times a day. The animal should be fed on soft food, and pressure on the part should be avoided.

Navicular bone.—See page 124.

Pastern bones.—This accident (*split-pastern*), generally, occurs from the violent concussion of fast galloping, which is sometimes aided by a diseased and brittle condition of the bone. The animal pulls up very lame, the toe only being brought near the ground. The absence of injury to the ligaments and tendons, and presence of swelling (after a short time), and pain about the hollow of the pastern, are often the only signs by which we can guess at the nature of the injury. Sometimes, the bone is broken into a great number of pieces, in which case, treatment will be of no avail. As the ligaments are particularly strong and numerous about this part, and as the covering membrane is thick, this fracture, frequently, occurs without displacement, when we may expect a favourable termination. In this case, after two or three days, the broken bone, on being felt, gives the impression that it is surrounded by a hard, thick covering (the insheathing material), which makes it of greater circumference than the corresponding bone of the other leg; and the inequalities which can be felt on the surface of the latter, at the back of the pastern, are absent on that of the former. At first, there is, above the fetlock, much sympathetic swelling, which rapidly goes down. The long pastern bone appears to be more liable to fracture than the short one. Although, when there has been little or no displacement, the horse, as a rule, makes a good recovery for slow work; still, if used for fast paces, he will rarely regain his former speed, on account of the fracture almost always extending into one or both joints. Also, the insheathing bony material is very apt to interfere with the action of the ligaments and tendons, especially, during the extreme flexion and extension entailed on the joints by the gallop.

Treatment.—The animal should be put in slings in order to enable him to give the fractured limb rest and to prevent the sound one being injured by too much weight being thrown on it. The shoe should be carefully removed, and sawdust put down, so that the horse may obtain an easy position for his foot. Although cases often do well when left alone and given complete rest; still it is the safer plan to support and fix the part by careful bandaging, which may be done in the following manner, as described by MM. Peuch and Toussaint:—At first, apply a cotton bandage—about three fingers broad and four yards long—around the pastern, taking care to spread a coating of a solution of plaster of Paris over the surface of the bandage as each turn is made, so as to render it immovable. A mass of tow soaked in the plaster of Paris solution, should be placed so as to fill up the hollow behind the pastern, and should be kept in its place by another bandage, over which a thick coating of plaster should also be applied. After a quarter of an hour, the plaster will become hard and will keep the part in a state of perfect rest. Care should be taken that none of these bandages are put on too tightly." "Charge" composition (see page 29), may replace plaster of Paris. It would be advisable, a month after the accident, to blister the part, once or twice, so as to hasten the process of union, and to cause absorption of any excess of insheathing bony material which may have been thrown out.

There may be some difficulty in distinguishing between ringbone and the roughness resulting from this fracture. (See page 148.)

Pelvis.—The pelvis is the large bony structure which supports the vertebræ of the hindquarters and furnishes the sockets in which the heads of the thigh bones rest. It may be fractured at various parts. We have considered on page 223, its commonest fracture, namely, that of the point of the hip, which is its most forward angle; and on page 225, the fracture of its rearmost point, the tuberosity of the ischium. Fractures of other portions of the pelvis may be distinguished by the affected side being flatter than natural; by peculiar lameness, in that the animal walks as if his back was injured, and carries his hind leg stiffly to the front, bringing it outwards, at the same time, with a circular movement; by the difficulty the animal has in rising, if he lies down; and by deformity, which may be felt on introducing the hand into the rectum. If the fracture extends into the hip joint, the case may be regarded as hopeless. Sometimes, the accident occurs close to the spot over which the nerves that supply the hind limb pass; in which event, the animal cannot be expected to regain soundness, as the process of repair will, almost certainly, interfere with these large nerves. The only possible *treatment* is to put the animal at rest in slings, apply a thick pitch plaster over the part, and keep him on green food.

Ribs.—These accidents are usually caused by kicks, or collisions. Unless the lungs or pleuræ (the membrane which lines the ribs and covers the lungs) are penetrated by the broken ends, no bad results need be anticipated. If the fractured ends have wounded the lungs, the tissue beneath the skin will soon become filled with air. This swelling can be distinguished from an effusion of serum or blood, by the fact of its emitting a crackling sound when the hand is passed over it. These complicated cases can seldom be treated successfully. It is bad practice to make an external wound for examination. Should such a wound have been caused by the original accident, it must be closed without delay. Professor Williams recommends that when a compound fracture of this nature exists, the operator should introduce his finger into the wound, and should endeavour to convert it into a simple fracture; supposing, of course, that an external wound already exists. The external opening may be covered over with a thick coating of pitch. The practice of bandaging the chest, in cases of broken ribs, does not seem to act well with horses.

It is not very uncommon to see horses with an abrupt depression over one of their ribs, caused by a fracture on some previous occasion.

Pain, evinced at the time of girthing up, is, sometimes, the first indication of a broken rib.

Shoulder blade.—These fractures usually occur on the spine, which is the ridge that stands out at right angles to the external surface of the bone; or, at the neck, which is the narrow and rounded part just above the joint. The former accident is not very serious. If a splinter is chipped off the spine, it will have to be removed. If the neck of this bone be broken, the presence of fracture may be perceived on looking at the part just above the "point of the shoulder" (the shoulder joint), when the horse is standing; when walking, he will carry the limb forward, while keeping it well away from the side. A fracture of the neck, or body, of the shoulder blade, without displacement, will simply require a long rest in slings. If the ends are displaced, an attempt may be made to "set" them by "drawing the limb forward, and, by means of the fist, pressing back into its position the part of the bone that bulges out." (*Delwart.*)

Tail.—The bones of the tail are, sometimes, broken by falls. We should endeavour to "set" them, and should support the part by padding, and apply, over the tail, a leather sheath, laced up moderately tight.

Tibia.—This bone is, on its inner surface, so unprotected, that it is not uncommonly fractured by kicks and other injuries. Its covering membrane is, however, so thick that often there is no displacement; hence, horse owners should make it a rigid rule, that, if one of their animals gets kicked on the inside of the hind leg, just above the hock, he should not be worked until all fear of a fracture is removed. A thickening of the bone over the seat of injury will indicate, after a few days, the existence of reparative action. The person treating the case should, on no account, when making his examination, work the parts about, lest he may cause displacement. The animal should be put into slings, or "tied up," so that he may not lie down; for, if fracture without displacement exists, it will almost certainly be converted into a compound one on the horse endeavouring to get up. The animal should be put in slings, and an immovable bandage applied to the limb, from the fetlock, to as high up on the leg as it can go. Splints may be applied over this, with an adhesive bandage to keep them in position. Many cases of compound fracture of the tibia may be cured in this manner; after, of course, setting the bones in position, in the first instance.

Trochanter major.—This is the bony mass which projects above the head of the thigh bone (femur) and covers the hip joint. The chief muscle which extends the thigh, and thus aids in propelling the animal's body forward, is attached to the trochanter major. The only treatment is prolonged and perfect rest. The horse often recovers after this accident sufficiently for light work. If repair does not appear to be readily taking place, the part may be blistered once or twice.

CHAPTER VIII.

DISLOCATIONS.

DISLOCATION OF THE PATELLA—DISLOCATION OF THE SHOULDER-JOINT—OTHER DISLOCATIONS.

Dislocation of the Patella.

ALTHOUGH this is a rare accident, it is the most common form of dislocation that occurs in the horse.

The patella, which corresponds to the knee-cap in human anatomy, is placed in front of the stifle joint, which is formed by the femur and tibia (see Fig. 20, page 214), in order to afford attachment and increased leverage to certain muscles, the office of which is to bring the hind leg forward. In order to keep the patella in its place, it is connected to the tibia, by three straight ligaments which antagonise the muscles in question; while there are two lateral ligaments—an internal and an external—which prevent it from slipping to one side or the other. The portion of the femur on which the patella works, is pulley-shaped, with two prominences and a groove between. As the internal prominence is larger and more advanced than the external one, the patella, when dislocation takes place, is almost invariably displaced to the outside.

Foals, on account of the comparative want of tenacity of their ligaments, are much more liable to this accident than are older animals, especially, if they are in a debilitated state, or are out at grass on a rough and hilly country, the nature of which would predispose them to this injury, which, however, may take place, as a result of accident, at any age. Young horses that suffer, off and on, from this dislocation, often lose their liability to it with increasing strength and age.

The dislocation may be complete or partial. In the former instance, the patella is entirely removed from the pulley-like portion of the femur, the two prominences of which can, then, be felt with the hand under the skin. In the latter and much more common case, it rests on the edge of the pulley, only one prominence of which will be uncovered. In both, the unusual position assumed by the patella will be manifest. When the dislocation is complete, the affected limb is kept pointed to the rear, straight and stiff; while the front of the wall of the hoof, or, even, the front of the pastern, rests on the ground. The limb is carried in the same manner, if the animal is made to walk, which he naturally does with great difficulty. When the displacement is partial, the lameness is similar to that just described, although less in degree. Professor Williams remarks that when the dislocation is incomplete, the patella may slip into and out of its position with a clucking noise, at every step the horse takes. Sometimes, both hind legs are affected, in which case, the displacement is usually incomplete.

When the dislocation is partial, it may become spontaneously reduced, if the animal is startled by the crack of a whip for instance, and made to move forward a few paces; or the patella may be pushed into its place with the hand, when the animal tries to advance the limb. When such simple measures do not suffice, or when the dislocation is complete, a rope should be attached to the pastern of the injured limb, passed through a collar (formed of rope, for instance) round the animal's neck, and should be drawn forcibly forward. The operator should, then, use every effort to push the patella into its place ; while, to assist him, the animal may be backed so as to force it to put weight on the affected leg. If these methods fail, the horse should be placed under the influence of chloroform, which will cause general relaxation of the muscles. No time should be lost in reducing the dislocation, for if this be not done, grave changes will quickly take place in the smooth articulating surfaces of the joint in question. When the patella is got into its proper position, the limb should be kept advanced by means of a side line fixed to its pastern and passed round the neck as a collar. A piece of iron attached to the toe of the shoe and projecting five or six inches to the front, will aid in keeping the stifle joint bent. The part may be kept at rest and repair hastened, by the application of one or two smart cantharides blisters. As this accident is liable to recur, and as the involved joint becomes more and more liable to it, the oftener it does so, we should not neglect the remedial means I have mentioned. After the effects of the second blister have gone off, the animal may be gradually put to work, or turned out to grass, as the case may be.

I have compiled the foregoing remarks on dislocation of the patella from MM. Peuch and Toussaint's *Chirurgie Vétérinaire.*

Dislocation of the Shoulder Joint.

Anatomy of the parts.—This is a ball-and-socket joint, formed by the rounded head of the humerus and the shallow cavity which is on the lower end of the shoulder blade. This joint possesses only one ligament, the capsular ligament, which envelopes it like a kind of bag, one mouth of which is attached round the cavity in the end of the shoulder blade; while the other is fixed round the head of the humerus. This ligament loosely envelopes the joint and allows the two articulating surfaces the power of separating from each other to the extent of nearly an inch. The stability of the joint is maintained by the muscles of the part which act, more or less, the part of ligaments to it, and also by the pressure of the atmosphere.

Definition.—The joint here involved is usually termed "the point of the shoulder," and is composed of the lower end of the shoulder blade and the head of the humerus, which may, according to the variety of the accident, be forced in front, behind, inside, or outside, the end of the shoulder blade. The head of the humerus will usually be found above the end of the scapula, and on the outside of it.

Cause.—This comparatively rare accident is generally caused by the horse falling violently on his side, with the leg placed in some awkward position.

Symptoms.—There will be marked deformity of the point of the shoulder, as may be seen if it be compared with the other side. Although the masses of muscle about the part make it difficult to determine the exact way in which the dislocation has occurred, we may, if the head of the humerus has been carried to the front, feel it as a rounded protuberance with a depression behind it; which symptoms will be reversed, if the head of the humerus be behind the shoulder blade. The dislocated limb will be incapable of almost any movement, and only the toe will touch the ground.

When the head of the humerus is pushed forward and outwards, the elbow will be turned in, and the toe pointed out.

As Rigot and others have observed, this dislocation is frequently complicated by fracture of the head of the humerus, or by a fracture, at the end of the shoulder blade, passing through the cavity which serves as the shallow socket in which the head of the humerus moves. We may distinguish, as pointed out by MM. Peuch and Toussaint, the fact of fracture of the head of the humerus having occurred, with or without dislocation, by observing that the part has got shorter, and that its mobility has increased, and by noting the grating together of the ends of the fractured bone. In dislocation without fracture, there is always abnormal stiffness of the limb.

Chances of recovery.—If a dislocation of the shoulder, uncomplicated by fracture, be undertaken early, and is properly treated, the animal ought, in the majority of cases, to make a good recovery, and be fit for any ordinary work in a month or two. Mr. Nunn, F.R.C.V.S. (see *The Veterinary Journal,* May, 1890), treated for this accident a mule, which returned to work, after having been on the sick list only twenty-five days. The chances of a recovery without lameness after a dislocation with fracture (unless there was no displacement) would be remote.

Treatment.—The horse should be thrown on his sound side, every precaution being taken that he does not get hurt. With this object, we might use ordinary or improvised slings, and should make his "falling" as soft as possible. It is almost essential to employ an anæsthetic, such as chloroform or ether; for without it the operator will have but little chance, if the horse be strong, of overcoming the resistance of the muscles of the part. Mr. Nunn remarks about his case, that "this mule was a miserable, weak animal, or I would never have been able to operate without chloroform." A rope should be attached to the pastern of the injured limb, which should be pulled backward so as to straighten it; or we might do this by means of a long piece of soft cloth attached to the forearm by a clove hitch. One man in front of the chest should press with his hands the head of the humerus backwards (if the dislocation be of the usual kind); while another kneeling behind the withers (as recommended by Mr. Blenkinsop, A.V.D.), places the palm of his hand at the back of the shoulder blade, as near the shoulder joint as possible. Similar arrangements may be made to suit the kind of dislocation, if it be of a different nature. The reduction of the dislocation will be accompanied by a dull click. If this be not heard, the altered and natural appearance of the limb will be a sufficient guide to show that the operation has been successful. After the animal has got up, he should be put into slings, and a blister rubbed over the seat of injury. I need hardly say that the slings should be fixed no higher than just to allow the patient to rest on them if he likes. The animal should be kept on laxative food. When he is seen to bear his weight on the leg, he may be very gradually brought on to exercise it. In this, and in determining the period during which the patient is to be kept in slings, the person in charge will have to exercise his own judgment. In favourable cases, the horse will be able to walk about in a week or ten days.

I have been told that swimming the horse, immediately after the accident, is a common method of treatment for dislocation of the shoulder in Australia and New Zealand, and that it is very successful. In such a case, the animal would be led from a boat or canoe, and not ridden.

Other Dislocations.

There are certain other forms of dislocation met with in the horse; but as they are of rare occurrence, and as they seldom admit of successful treatment, we need not discuss them here.

CHAPTER IX.

Synovial Enlargements.

WINDGALLS—BOG SPAVIN—THOROUGHPIN—CAPPED KNEE—SYNOVIAL CAPPED HOCK.

Anatomy.—In order to diminish friction between certain structures, closed membranous sacs, containing an oily fluid called *synovia*, or (vulgarly) joint oil, are placed between them. As work causes an increased secretion of this fluid, we frequently find that, from its prolonged continuance, a chronic distended condition of these sacs ensues, with little or no inflammatory symptoms. Thus we have in bog spavin an enlargement of the synovial membrane which lines the capsular ligament of the true hock joint; in capped-knee, we find distension of the synovial bursæ which facilitate the movement of the extensor tendon over the front of the knee; and, in thoroughpin, there is distension of the synovial sheath which allows the perforans tendon to glide smoothly over the os calcis. (See Fig. 4, page 34). These instances afford us examples of the three actions respectively performed by the three classes of synovial membranes, viz.: to line the capsular ligaments of joints; to allow one surface to glide over another; and to line a canal or sheath through which a tendon passes.

With the exception of capped knee, which is the result of injuries these enlargements are, as a rule, signs of work in old horses, and of weakness in young ones. In the great majority of cases, the superabundant synovia remains unchanged, and the animal suffers little or no inconvenience from its accumulation. In some rare instances, the fluid becomes organised into fibrous tissue, which is hard and unyielding to the touch, and may, even, become converted into bone. As these diseases rarely affect the usefulness of an animal, they should not, as a rule, be interfered with.

General Treatment.—The best thing to do, if practicable, is to apply pressure by means of cotton wool (see page 27), or other soft material. If we cannot do this, and if heat and inflammation be present, we may apply warm fomentations ; put the horse on laxative food ; and give a purgative if necessary. When applicable, we may employ a high-heeled shoe in order to throw the part into a state of rest. Trusses made for the reduction of bog spavins and thoroughpins, may be employed. The continued application of tincture of iodine, rubbed in twice a day, has been found to be of service in some cases. Blisters and rest may cause absorption for the time being ; but the distention will, generally, reappear as bad as ever on the resumption of work.

When there is no inflammation or abnormal heat in the part, the excess of synovia may readily be drawn off by means of an aspirator, which is a surgical instrument made for the purpose. This operation, which should be carried out under antiseptic precautions, has to be performed with skill and great care ; so that suppuration may not ensue. The animal should of course be properly secured.

Windgalls

May be said to be a distended condition of the synovial sacs of the fetlock. They appear in the form of soft, "puffy" swellings, which may vary, in magnitude, from the size of a pea, to that of a hen's egg, or even larger.

Anatomy.—The usual positions they occupy are as follows:—1. In the space between the branches of the suspensory ligament and the perforans tendon: this is their usual site. 2. "In the interval between the perforatus and perforans tendons, about two inches above the sesamoid bones; indeed, the sac of the windgall, from surrounding attachments to its borders, appears as though it gave passage to the perforans tendon through its cavity: though this appearance, in point of fact, is owing to the membrane of the bursa being reflected upon the surface of the tendon." (*Percivall.*) 3. In front of the fetlock under the tendon which extends the foot. 4. As mentioned by Mr. Percivall, in front of the fetlock, but between the extensor tendon and the skin. 5. Between the sesamoid bones and the perforans tendon. In this last form, as the distended sac cannot, owing to the pressure of the perforans tendon, bulge backwards, it appears as a puffy swelling at both sides of the back of the fetlock, constituting what we may term *thoroughpin of the fetlock.* If, as pointed out by Professor Williams, we find that this enlargement is soft and yielding, we may regard it as of little consequence; but if it feels tense, although it may fluctuate on pressure, we may deem its presence to be owing to inflammation of this synovial sac; a condition which constitutes that most intractable disease, sesamoiditis (see page 40), and which is a very grave unsoundness whether the horse goes lame or not; for although the lameness may disappear with rest, it will return as soon as the animal is put to work again.

Treatment.—Although windgalls are of little consequence; still, for appearance sake and to prevent their further development, we may, with advantage, try cotton wool bandaging (see page 27), which has a marvellous effect in reducing them. If this bandaging be discontinued, the probability is that the windgalls will again show as soon as work is recommenced.

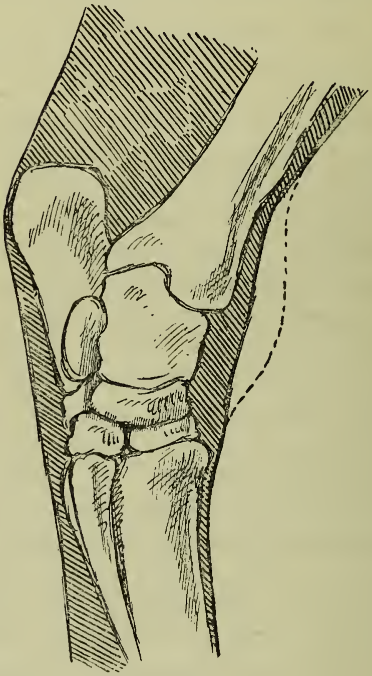


FIG. 23.

When the appearance of a windgall is accompanied by heat, and especially when there is tenderness and lameness; we may regard the enlargement as a

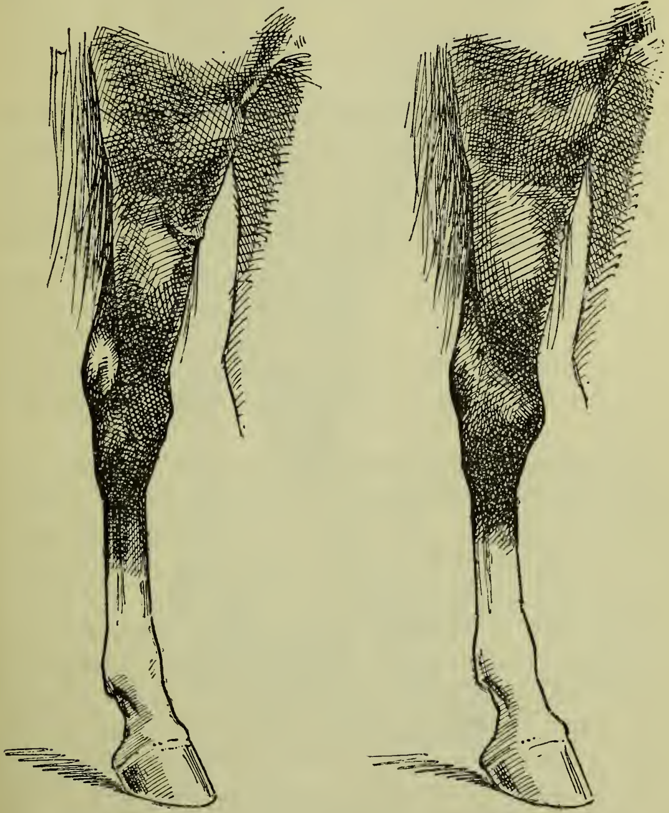


Fig. 24.

symptom of sprain to tendon or ligament, or of inflammation of bone from concussion. Here, also, cotton wool bandaging will be the best treatment.

Bog Spavin

Appears as a soft swelling to the front and to the inner side of the hock joint. Its position is higher up than the seat of bone spavin. It is indicated by a dotted line in Fig. 23. Fig. 24 shows two off hind legs; one sound, and the other affected with bog spavin.

Anatomy.—It is a distended condition of the synovial membrane of the capsular ligament of the true hock joint—that which is formed by the tibia and astragalus—and lies between the base of the astragalus and the internal lateral prominence (the malleolus) of the tibia. "It shows itself at the inner side of the joint, because here the ligaments are wider apart, and there is more room for distension." (*Stonehenge.*) It is soft and elastic, and extends up and down the inner front of the joint for about four inches, or more, as the case may be.

Bog spavins, sometimes, come on as a simple over-supply of synovia, without any symptoms of inflammation; but, in other cases, the distension is, at first, hard, painful to the touch, and accompanied with more or less lameness, indicating sprain, or other injury, of some of the underlying structures. In the former instance, the affection seldom impairs the usefulness of the animal, and is, generally, the effect of premature overwork, or of a defective shape of the joints frequently due to hereditary predisposition; and the swelling is soft, fluctuating, and cool to the touch. In the latter, the injury may have grave consequences.

Thoroughpins usually accompany large bog spavins, because the distended bursa of the latter tends to push up the bursa of the perforans tendon out of its place.

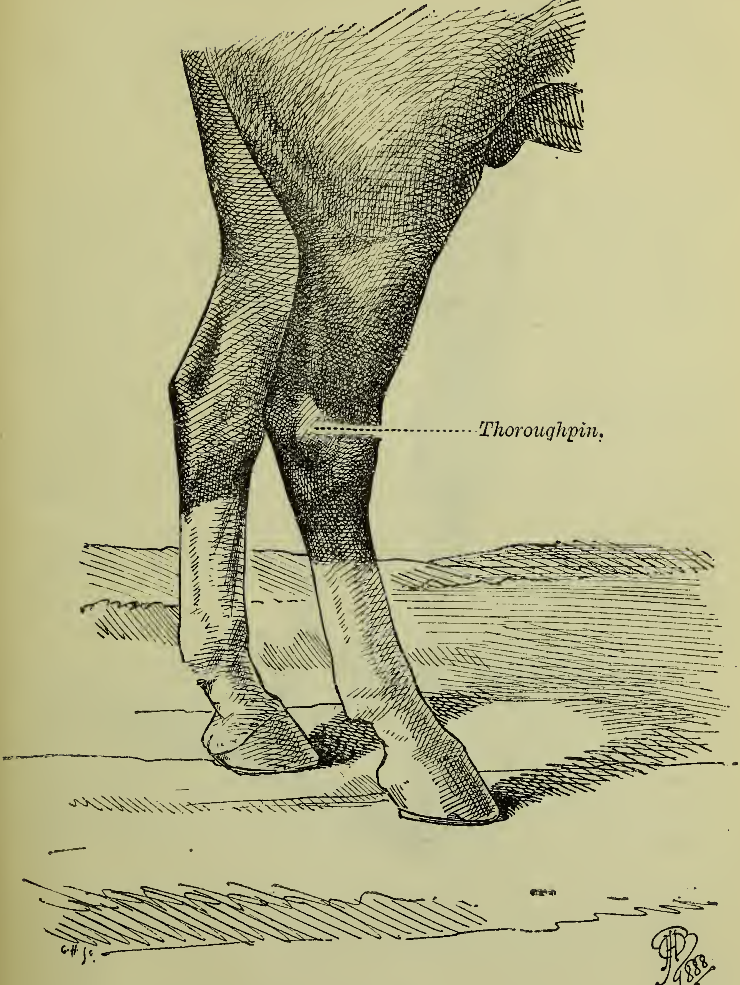


Fig. 25.

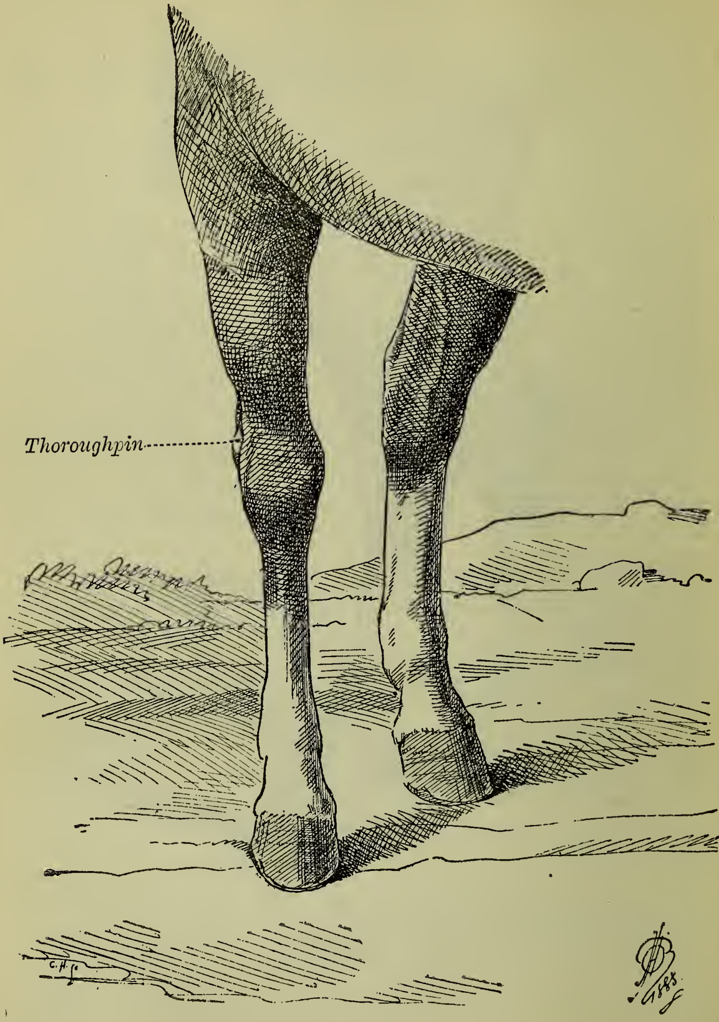


FIG. 26.

See "General Treatment," page 240.

A bog spavin should not be punctured in order to let out the fluid; as doing so may cause "open joint." It is possible, however, to do so with impunity, by means of an aspirator (see page 240).

Thoroughpin

Appears as a swelling at the back of the hind leg, just above the point of the hock, and in front of the tendons (the hamstring) which are attached to that part. When pressed with the finger at one side of the limb, it will bulge out with increased prominence on the other side. Hence the name. (See Figs. 25 and 26.)

Anatomy.—It is a distended condition of the synovial sheath which surrounds the perforans tendon as it passes over the os calcis. The sac thus formed is pushed up into the space between the perforans tendon and the tendo-Achillis, which is the name given to the tendons that pass down to the point of the hock. (See Fig. 4.)

The remark as to the influence of heredity in cases of bog spavin, also applies to thoroughpin.

Thoroughpin, like bog spavin, is often caused simply by an over-supply of synovia; in which case it is of little moment. When, however, it is due to sprain of the flexor tendon, it is a very serious affection. Heavy cart stallions not uncommonly get these enlargements from the strain on their hocks consequent on covering.

See "General Treatment," page 240.

Capped Knee

Is a distended condition of one or both of the synovial bursæ of the tendon (extensor metacarpi magnus) which passes over the front of the knee. It is usually caused by blows. It may also occur, especially when hunting or steeplechasing, from a thorn (see page 194) puncturing the tendon which plays over the bag containing the joint oil. When this accident happens, inflammation is set up in the tendon, and an increased supply of blood is drawn to the part, the synovial sacs becoming, thereby, stimulated, and, consequently, distended with fluid.

Capped knee is of very little consequence when it is simply a distended condition of the synovial sacs; but if the tendon be also affected, it is a serious complaint, and will be accompanied with more or less lameness.

Treatment.—If the case does not yield to the effects of rest and bathing with warm water, we may rub into the part, with a certain amount of friction, tincture of iodine two or three times a day. If the swelling still continues, we may blister it with biniodide of mercury. The synovia in the distended sac may, then, become absorbed on undergoing a further change. If, after a blister or two, the swelling still remains soft, we may draw off the fluid at its lowest point by means of the aspirator, under antiseptic precautions, and bandage. Or, as is usually done, we may make a small horizontal incision at the lowest point of the sac, and then apply a firm bandage over the part: the orifice should be kept open for a short time, by means of a small piece of lint or cotton, so that any remaining fluid may drain off. As soon as slight suppuration is set up, the lint or cotton may be withdrawn. The object of the bandage is to cause the walls of the sac to unite together.

Synovial Capped Hock.

There is a form of capped hock due to enlargement of the synovial bursæ which is placed between the point of the hock and the tendon that is attached to it. "It appears as a tense fluctuating swelling, situated on both sides of the point of the hock." (*Williams.*) The rigidity of the tendon prevents the swelling projecting backwards. This not very common affection is, undoubtedly, an unsoundness. It may be caused by sprain of the tendon, or by blows. The treatment may consist in giving rest, applying a high-heeled shoe, blistering or firing.

For the more common, though less serious form of capped hock, see next chapter.

CHAPTER IX.*

Serous Sacs.

CAPPED HOCK—CAPPED ELBOW.

Serum, which is the fluid we find on opening a blister, often accumulates at the point of the hock, or at the back of the elbow, causing these parts to become "capped," as a result of injury. Unlike synovia, serum generally becomes quickly organised into a low form of fibrous tissue.

These enlargements, though unsightly, rarely cause uneasiness to the horse; they may, however, be treated boldly by surgical means, as they are well removed from any important structures.

Capped Hock.

Ordinary capped hock is a serous sac situated at the point of the hock (see Fig. 27), between the cap of the perforatus tendon and the skin. (See Fig. 4, page 34.) It is usually the result of blows, which are generally self-inflicted. Although its presence detracts from an animal's value, especially, as it may indicate vice; it rarely affects the horse's usefulness, unless the part is inflamed.

Treatment.—When the injury is recent, warm fomentations should be applied. If an attempt is to be made to reduce the tumour—which should not be done until all heat and inflammation have subsided—a seton, which should not be allowed to remain longer in than ten days or a fortnight, may be passed through its

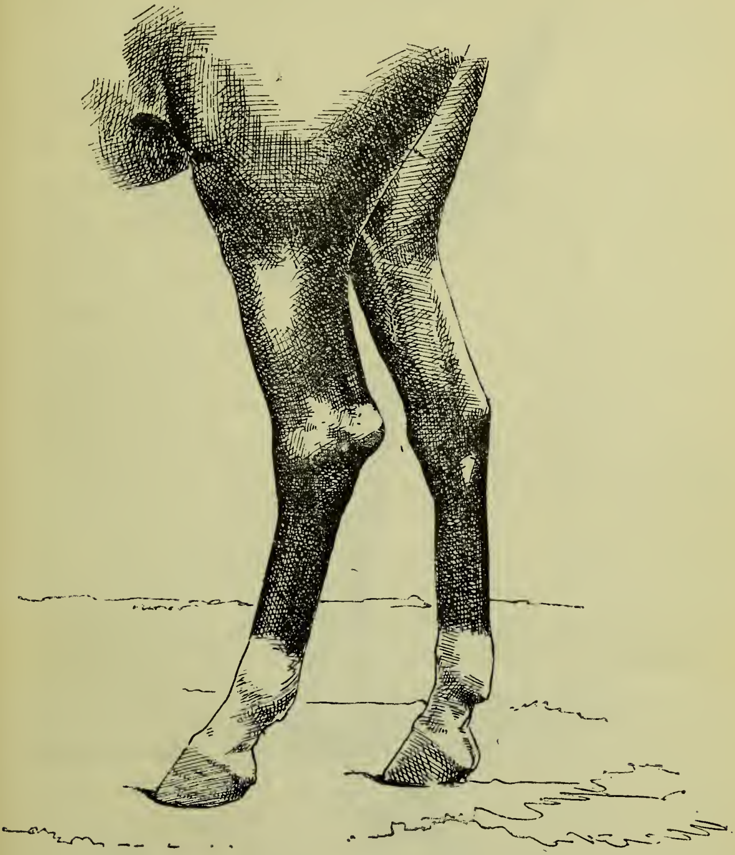


Fig. 27.

centre; or the part may be stimulated, from time to time, with the biniodide of mercury. As the enlargement is not connected with any important structure, it may, after it has become hard and free from all heat,

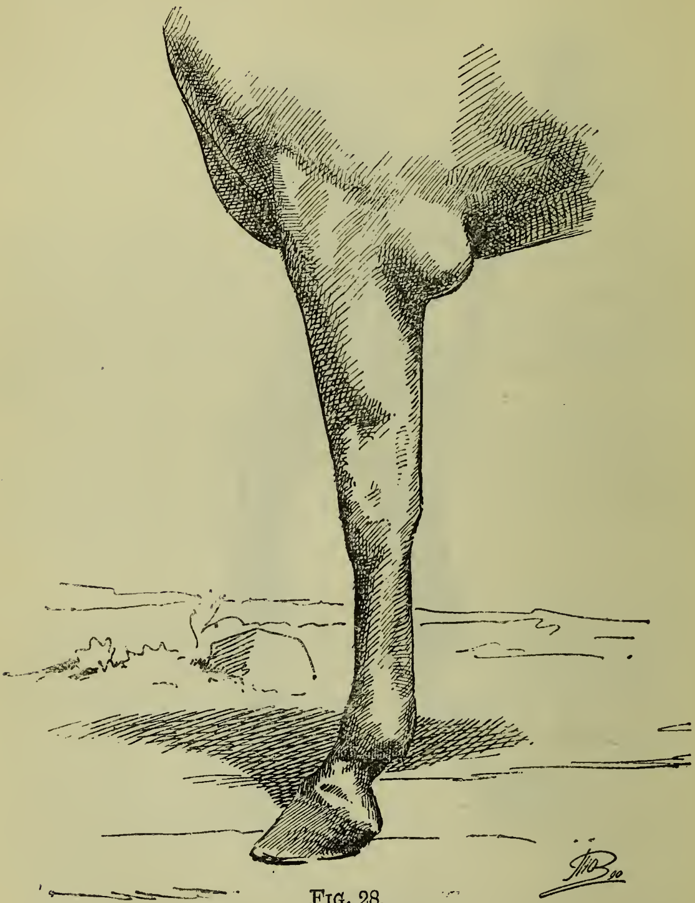


FIG. 28.

be removed by the knife under antiseptic preca ution (see page 169).

Capped Elbow

Is a serous sac situated behind the elbow joint (see Fig. 28), and is almost always caused by the part being hurt by the heels of the shoe pressing upon it when the horse is lying down.

It rarely causes lameness.

We may, generally, arrest its development if we treat it properly in its earliest stage. With this object in view, remove the shoe, or get the horse shod with short shoes, and at night cover the heels with some soft material, such as felt, so that they may not hurt the elbow; or tie him up. Or we may apply a kind of pillow round his fore-arm, a little above his knee; so that, when he lies down, his heel will not be able to touch his elbow. Use continued fomentations of warm water for a few days, and after that rub in for a considerable time every day, for a fortnight or so, the following liniment—

Soap liniment	¼ pint.
Strong liquor ammoniæ . .	½ drachm.

The pressure caused by the rubbing and the stimulating effect of the liniment will, generally, make the tumour disappear. If the enlargement does not yield to these simple means, we may pass a seton through its centre in a vertical direction, and allow it to remain in for not longer than ten days or a fortnight. If it is already hard and fibrous, we may safely remove it with the knife, or with the écraseur. To accomplish this, make a long vertical incision through the skin, and then carefully dissect the tumour out. The application of any suitable antiseptic (see pages 169 to 173), will constitute all the after treatment required.

CHAPTER X.

Diseases of the Eye.

SKETCH OF THE ANATOMY OF THE EYE—SIMPLE OPHTHALMIA—PERIODIC OPHTHALMIA, OR MOON BLINDNESS—CATARACT—WORM IN THE EYE—AMAUROSIS, OR GLASS EYE.

Sketch of the Anatomy of the Eye.

The surface of the eye and the inside of the eyelids is covered by the *conjunctiva*, which is a delicate mucous membrane. The front of the eyeball consists of a strong transparent structure, the *cornea*, which is somewhat of the form of a small watch-glass; while the remainder consists of a strong fibrous coat, the *sclerotica*, which is lined by a dark membrane, the *choroid*. Behind the cornea, and attached to the choroid, hangs a thin contractile curtain, termed the *iris*, through the centre of which there is an elliptical opening known as the *pupil of the eye*. The anterior portion of the sclerotica lies immediately under the so-called *white of the eye*, which is the expansion of the tendons of certain muscles. We may regard the cornea as the continuation of the sclerotica; and the iris, as that of the choroid.

The pupil is dilated by means of radiating muscular fibres that are in the iris; and closed, by circular fibres placed round the margin of the opening. The distinctive colour of the eye is derived from that of the iris, which "is variously coloured, but in the horse is brown, with more or less of a yellow tinge; sometimes, however, it is almost white or grey, when the animal is said to be 'wall-eyed.'" (*Strangeways.*) Behind the iris, which is slightly convex, and suspended from the choroid, is a biconvex, transparent, solid body—*the crystalline lens*—which is compared by Chauveau to a rose diamond. The lens divides the eye into two compartments: the anterior, which is partially divided by the iris, and filled by a watery fluid called the *aqueous humour;* and the posterior, which holds a very similar, but denser, liquid—the *vitreous humour*. The crystalline lens is covered by a transparent membrane called the *capsule*.

DIAGRAM OF A SECTION OF THE EYE.

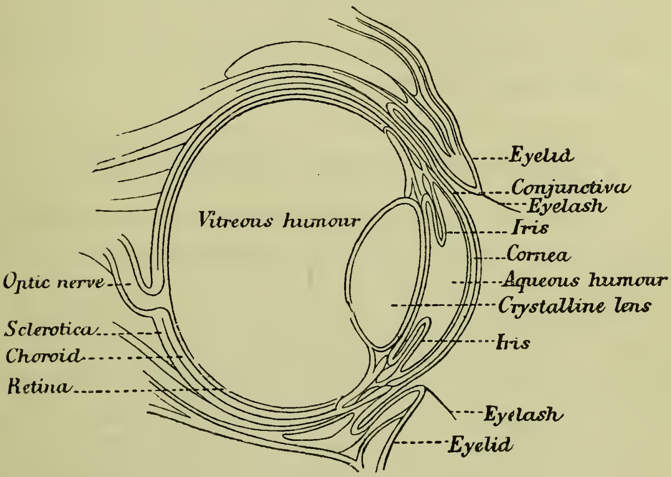


FIG. 29.

The *optic nerve*, proceeding from the brain, enters the eyeball at its posterior part, and pierces the sclerotica, and choroid; it, then, by its expansion, forms a membrane, the *retina*, which lines the choroid, and terminates at the circumference of the crystalline lens. When rays of light, coming from any object, fall on the eye, they enter through the pupil, and, becoming refracted by the crystalline lens, are thrown on the retina, which conveys, through the optic nerve and, thence, to the brain, an impression of the object seen. The choroid is dark-coloured, so as to enable it to absorb any superfluous rays. The pupil has the power of contracting and dilating in order to regulate the admittance of light.

Simple Ophthalmia (Conjunctivitis)

Is inflammation of the membrane (the conjunctiva) which covers the surface of the eye, and lines the eyelids.

When it is caused by a blow directly inflicted on the cornea, the opacity radiates from the point struck. This appearance, which will serve to distinguish the affection from that due to cold, will not be present when the eye has been injured at a moment when it was protected by the eyelid. In this last-mentioned case, there will often be a mark of the injury on the skin which covers the eye. In catarrhal inflammations of the eyes, the opacity commences at the inner corner of the eye.

Symptoms.—The eye has the appearance of having received a blow. The eyelids are closed and swollen. The eyeball is drawn back. Tears flow copiously. The haw projects; and there is intolerance of light. The conjunctiva is inflamed. The cornea gradually becomes clouded; and the opacity appears to be superficial and of a bluish colour : characteristics which distinguish this disease from periodic ophthalmia.

Treatment.—Examine the part to see if there be any external injury ; if a foreign body be found in the eye, remove it with caution. To do this, we may have to pull back the haw by transfixing it with a needle and thread. Give a dose of physic, and keep the animal on laxative food. Foment the part with warm water, and keep the horse in darkness. Smear, from time to time, the skin round the eyelids with the extract of belladonna, which may be made to adhere by mixing it with a little glycerine ; or place, if procurable, one of Savory and Moore's gelatine discs of atropine in the eye. They give the best results and entail no trouble. The belladonna, by virtue of its active principle, atropine, relieves the congestion of the blood-vessels by causing their muscular coats to contract. If the eye remains weak, it may be stimulated by the application of a few drops of—

Nitrate of silver . . .	2	grains.
Or, sulphate of zinc . . .	3	,,
Or, alum	6	,,
Water	1	oz.

or Savory and Moore's discs of nitrate of silver or zinc may be tried.

Periodic Ophthalmia, or Moon Blindness.

This somewhat rare disease is induced by bad sanitary arrangements ; by hereditary predisposition ; and, according to Mr. Percivall, by the injurious influences of wet, marshy pastures on which horses have been reared. Using, for stud purposes, stallions whose eyes were affected, was formerly a frequent cause of blindness among Irish horses. This disease appears to be an inflammation of the whole structure of the eye; but in simple ophthalmia, only the membrane which covers the eye is affected. It is, generally, confined to one optic. The symptoms come on suddenly, and resemble those of simple ophthalmia, except that the interior of the eye becomes of a dim, dull, amber coloured appearance; and the cornea becomes clouded. In the other affection, the inflammation is confined to the surface of the eye. At first the pupil is contracted.

The intensity of the symptoms, usually, begins to abate after about a week, and the cornea and conjunctiva gradually assume, more or less, their normal condition. Mr. Gamgee observes that "the first attacks are usually the longest, and their duration diminishes, as a rule, with their recurrence. During the progress of apparent recovery a relapse is not unfrequent, and the term may be thus indefinitely lengthened. The interval between the attacks is, on an average, about sixty days. The eye may seem quite clear during the intermission; but it has not returned to its normal condition. The outline of the upper eyelid is usually altered. It presents a slight bend in its internal part, so that the upper joins the lower lid, at the inner angle, by a right, in place of an acute, angle. This is best marked after several severe attacks, and gives a triangular outline to the opening between the lids." There may be recurrent attacks after the horse has become totally blind.

Professor Williams notes the peculiarly wrinkled or furrowed appearance which the upper lid and eyebrow assume. The eye appears smaller than it ought to do, and looks dull and weak. In confirmed cases, the haw is prominent, the cornea more or less opaque, and the iris and aqueous humour changed in colour. These indications may be of use to an intending purchaser. This disease usually terminates in cataract; although the latter affection may come on independently of the former.

Cataract

Is an opaque condition of the crystalline lens, or of its capsule, or of both structures at the same time, by reason of which the light that enters the pupil, is obstructed on its way to the retina; blindness, total or partial, being the natural result. A cataract may consist of only a small white or bluish-white spot which slightly obscures the vision, and it may then be the cause of shying in the animal; or it may completely cover the affected structures. In the former case, if the horse be taken into a dark room and the eye be examined by the light of a candle, the speck may be seen through the pupil, which will, more or less perfectly, contract or dilate on the approach or removal of the taper; but in the latter, the cataract will appear like a white curtain drawn across the opening of the pupil, which is probably now quite insensible to the action of light. A careful comparison of the behaviour of both eyes under the influence of the light of a candle in a room, in which there is no other source of light, will aid the correctness of the examination. White specks on the cornea should not be confounded with cataract.

An examination of the eyes in daylight is apt to lead an inexperienced observer into error, owing to the fact that light reflected into the eye from white objects, such as white-washed walls, white clothing, etc. causes the formation of white images within the interior of the eye.

The presence of cataract is best tested—under ordinary circumstances—by holding upright a lighted candle in front of the suspected eye, in which, if it be healthy, three vertical reflections of the candle will be seen, one on the cornea, a second on the front of the crystalline lens, and a third, turned upside down, on the back of the lens. The inverted position of the last-mentioned image is due to the fact that the rays of light become refracted on passing through the lens. If the candle be gently moved from right to left, the first and second images will move in the same way, while the third will go from left to right, and *vice versa*. When the cataract is complete, it will, naturally, prevent the formation of the third image. Old cataracts have a pearly white appearance. Newly formed ones are bluish in colour.

In human practice, an eye suffering from cataract may be operated upon by cutting through the cornea and removing the crystalline lens. The eye will, after this, require the aid of glasses in order to bring the rays of light into focus. But, as spectacles cannot be easily adjusted to the eyes of horses, the operation for cataract is very rarely tried on them.

Worm in the Eye.

This disease is hardly ever met with except in India, in some districts of which country it is not of unfrequent occurrence. It consists in the appearance of a thin thread-like worm in the aqueous humour of the horse's eye. The parasite varies from about half to one inch in length. Dr. Cobbold states that they are of two kinds, viz., the *Filaria papillosa*, the arge, and the *Spiroptera lachrymalis*, the small variety. These worms are met with in various parts of the system, as well as the eye. They and their eggs are abundantly found in stagnant waters in India and are taken, along with the fluid the horse drinks, into his stomach and intestines, where some of the eggs or immature parasites, being extremely minute, are absorbed into the blood-vessels and taken into the general circulation, to be deposited in their fitting place, from which, on becoming fully developed, the mature worms issue into active life.

The first sign of the presence of the worm is a slight opacity or milky appearance of the cornea, due to inflammation; while, beneath the cornea, the parasite may be observed moving about. Simple ophthalmia may be distinguished from "worm in the eye" by observing the inflamed appearance of the eyelids, which is its first symptom, and which is naturally absent in the disease we are at present considering. There is, also, over the eye a generally diffused dimness, which, as a rule, rapidly increases. No time should now be lost in operating; for if the worm be left undisturbed, the inflammation of the cornea will proceed, and the animal will probably lose its sight in a short time. The removal of the parasite may be effected by puncturing the cornea with a sharp pointed knife, the point being guarded by thread wrapped round the blade, so as to leave about a quarter of an inch of the point bare. The horse should be cast, and a truss of straw placed under his head, which should be steadied and kept down by the assistance of a couple of men. The prepared bag of sand, alluded to on page 545, may be used here with advantage. If procurable, an eye dilator should be employed. Holding the knife between the finger and thumb, while resting the hand close to the eye and keeping the point of the instrument almost touching the eye at the spot where it is intended to puncture, the operator should wait until he finds the parasite in a convenient position to make its exit. He should then make the incision by a strong, firm pressure. The puncture should be oblique, and close to where the cornea joins the white of the eye, and on the outer or inner upper margin, as may be most convenient. Obliquely, to avoid wounding the iris, and, also, to allow of the ready union of the edges of the wound; and high up, so that the subsequent scar may be covered by the upper eyelid, and that the rays of light which enter the pupil may not be interfered with, and, also, to prevent too great an escape of fluid. In the majority of cases, the worm seems anxious to quit the eye ; as it will generally make its escape if the aperture be big enough, even if it has not been drawn through by the first rush of fluid. In India, the operation is often done standing; but it is much safer to cast the horse, and also, to use chloroform. This, however, is hardly necessary, if we use a twitch, and put into the eye a few drops of a 10 per cent. solution of the hydrochlorate of cocaine.

It may not unfrequently be observed, while the eye remains moderately clear, that the worm suddenly disappears, and then, after some time, comes into view again. In this case, it inserts itself, for the time being, between the iris and lens. In Fig. 29, there is a space shown between these two structures, which is done merely for clearness sake; for it is most probable that, during life, the margin of the pupil remains touching the lens, unless when the pupil is widely dilated. At the same time, the contact is loose enough to allow the worm to wriggle itself between the lens and iris. The use of belladonna in the treatment of inflammation of the eye, is to prevent the iris, at the margin of the pupil, from permanently adhering to the lens, which, if it remained in contact with the lens, it would be apt to do, owing to the adhesive nature of inflammatory lymph. The use of atropine (the active principle of belladonna), obviates the risk of adhesions being formed, by causing the radiating muscular fibres of the iris to contract, and, thus, to draw the margin of the pupil clear of the lens. It occasionally happens in cases that are not treated, that the worm disappears from the eye and leaves no trace behind.

The subsequent treatment may consist in shading the eye from light, applying cold water, or any of the applications recommended on page 257, and keeping the pupil dilated, for a couple of days, with belladonna. One should be careful not to use more of this drug than sufficient for the purpose in view. The horse should be liberally fed, and may get 1½ drachms of sulphate of iron, twice a day, in his food, for a week or ten days. Salts of iron, owing to their tonic and astringent effects, have a powerful effect in preventing the development of parasites in the system.

Amaurosis, or Glass Eye

Is not a disease of the eye itself, but is the condition of an eye in which there is loss of function of the optic nerve, which renders the retina insensible to the action of light. It may be due to some affection of this nerve, or to sympathetic causes. If owing to the former, it is incurable ; if to the latter, it will disappear according as the original disease is relieved. The functions of the optic nerve may become arrested by pressure on it from tumours in the brain, or by the loss of blood supply from the blocking up of the small artery which is in the centre of this nerve. A blow, a sudden shock, or a flash of lightning close to the eye may, also, render it amaurotic.

In the majority of cases, both eyes are affected. The presence of the disease may be known by the fact of the pupil remaining dilated and immovable under the influence of light, while the interior of the eye looks bright, healthy, and somewhat clearer than natural—in fact, it looks glassy; hence its common name. The eyelids are opened wide; and when both eyes are affected, the animal's action and appearance denote that he is blind.

If one eye only be amaurotic, its pupil will contract when light falls on the sound eye; but if the blind eye be alone subjected to the influence of light, neither its own pupil nor that of the healthy one will contract. The influence which the sound eye has on the blind one, is owing to the distribution of the optic nerve-fibres; there being a nervous connection between the two eyes, as well as between each eye and the opposite nerve root. That portion of the nerve which proceeds from the blind eye to the brain, having lost its function, is unable to influence the healthy eye.

CHAPTER XI.

DISEASES OF THE ORGANS OF BREATHING.

SKETCH OF THE ANATOMY OF THE ORGANS OF BREATHING—PNEUMONIA, PLEURISY, AND BRONCHITIS—EPIZOOTIC PLEURO-PNEUMONIA—GENERAL TREATMENT—CONGESTION OF THE LUNGS—SORE THROAT—CATARRH, OR COLD IN THE HEAD—COUGH—BROKEN WIND AND ASTHMA—ROARING—THICK WIND—HIGH-BLOWING.

Sketch of the Anatomy of the Organs of Breathing.

THE passages from the nostrils open into a cavity called the *pharynx*, which also communicates with the mouth through an opening termed the *isthmus*, over which the soft palate is suspended, as a valvular curtain, in order to keep it shut, except during the passage of food or water; hence, the horse is unable to breathe through his mouth. The windpipe, or *trachea*, opens into the pharynx by means of a short cartilaginous tube, the *larynx*, which is the organ of voice. It is situated between the angles of the branches of the lower jaw. When it is inflamed, we have *laryngitis*, or sore throat. The larynx is guarded from the entrance of food, water, etc., by a cartilaginous valve called the *epiglottis*, over which the mouthful of food, or "go-down" of water, passes. The windpipe, or *trachea*, is an elastic tube formed of incomplete cartilaginous rings; it terminates at the base of the heart, and splits up into two tubes

—the right and left *bronchi*—which respectively go to the right and left lung. These bronchi further subdivide into a great number of branches called the *bronchia*, or *bronchial tubes*, which finally open into the air-cells of the lungs. "The entire ramification when isolated has the appearance of a tree, the trachea being the

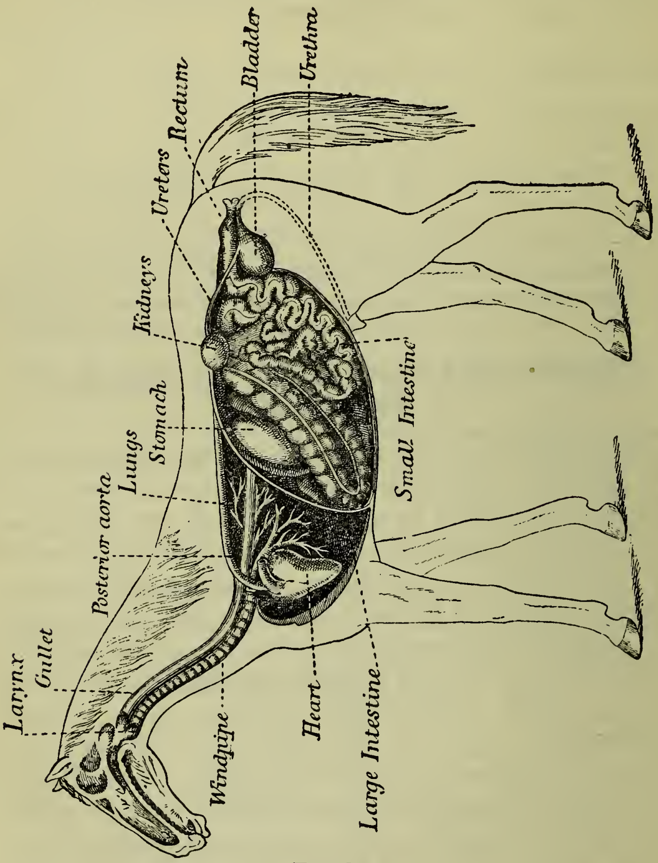


Fig. 30.

main trunk, the bronchi and bronchial tubes the branches, and the air-cells the leaves." (*Strangeways' Anatomy.*) The nasal passages, the pharynx, larynx, and bronchial tubes are lined with mucous membrane. Thus, in sore throat and bronchitis (inflammation of the bronchial tubes), we have, at first, a dry and inflamed condition of this mucous membrane, succeeded by an increased secretion of phlegm (mucus).

The mucous membrane is what we may call the internal skin which lines various hollow organs, such as the air-passages, mouth, gullet, stomach, intestines, eyelids, interior of the ears, genital and urinary organs. It secretes *mucus* which corresponds to the cuticle given off by the skin.

The lungs are composed of a spongy substance, which is made up of a vast number of small lobules that are connected together and kept separate by cellular tissue. Each of these lobules is composed of a number of minute air-cells, and is supplied with a small bronchial tube, which conveys air to these cells. The capillary blood-vessels "are so arranged between the two layers forming the walls of two adjacent cells, as to expose one of their surfaces to each, in order to secure the influence of the air upon them." (*Fleming.*) The blood thus brought into extremely close proximity with the air contained in the cells, while traversing their walls, takes up the necessary supply of oxygen for the requirements of the system, and, on its return to the lungs, gives off the carbonic acid which it absorbed from the various tissues. The skin, to a small extent, also excretes carbonic acid.

The *pleuræ* are two smooth and glistening membranes which line the cavity of the chest and cover the lungs, thus forming two closed sacs; their office being to prevent friction between the lungs and the walls of the chest. They secrete *serum*—the watery fluid contained in a blister—with which to lubricate their inner surfaces.

Pneumonia, Pleurisy, and Bronchitis.

The lungs are so intimately connected with the bronchial tubes and the pleuræ, that they are rarely affected without either of the other two structures being, also, implicated; and, if either of them becomes inflamed, the lungs will, in all probability, participate in the derangement. Hence, we more frequently find broncho-pneumonia, or pleuro-pneumonia, than pneumonia, pleurisy, or bronchitis in a pure form. I shall briefly describe the respective symptoms of the last mentioned diseases, so that the reader may draw his own inferences in complicated cases, which present far too great variety to admit of detailed description; and shall, finally, give the general treatment which is applicable to all of them, with such special directions as the symptoms may indicate.

Generally speaking, these diseases occur in three ways: (1.) By some mechanical irritant, as may happen when a drench of turpentine and oil "goes the wrong way;" or when the sharp end of a broken rib pierces the lung. (2.) As secondary diseases; for instance, when the lungs become invaded with the abscesses of glanders. (3.) As distinct diseases; in which case, there is strong reason for believing that they are fevers which involve the entire system, and have a local manifestation in the organs of breathing. The practical considerations which bear out this view are as follows. (*a.*) These diseases often assume an epizootic type. (*b.*) They run a regular course of about a week or ten days. (*c.*) The treatment which best succeeds is one based on the theory that the disease is caused by the presence of some virus in the system, and that, consequently, our efforts should be directed in furthering its removal, and, at the same time, supporting the animal's vital powers. We may view exposure to cold, and chill, as predisposing or exciting causes.

I may mention in passing, that the word "epizootic" is applied to animals, in the same manner as "epidemic" is to men.

In these diseases, as in all other inflammations, there is an escape of watery fluid (lymph) from the vessels of the inflamed part, which lymph, at first, becomes consolidated, and afterwards breaks up, and is, more or less, removed, as we may see in the case of an ordinary sprain.

As an unprofessional observer of these chest disorders will often be unable to detect the disease in its first stage—the horse, at the outset, usually, appearing to him to be simply dull and out of sorts—the attack will, in many cases, have run a part of its course before its existence is suspected.

Horse owners should remember that of all stables liable to induce chest-diseases, cold, draughty ones are the worst.

Generally, in these complaints, the horse refuses to lie down; the bowels are costive; the dung mixed with flakes of mucus, which indicates irritation of the intestines, and, therefore, the non-administration of aperients, which are irritants in themselves; and the rate of breathing (ordinary rate when at rest, 12 or 13 per minute) is increased.

"Respiration in the horse is more regular than in the other animals, and an increase in rate of breathing, when the animal is at rest, always indicates some derangement; at the same time the careful examiner, even in the case of the horse, pays more attention to the peculiarity of the respiratory action than to the frequency of the act." (*The Field.*)

Pneumonia (*inflammation of the lungs*).—Generally speaking, this disease may be defined as inflammation of the substance of the lungs. It is rarely, as before mentioned, seen in an uncomplicated form. Pneumonia often follows congestion of the lungs. In a regular attack, there are three stages, namely, *engorgement* of blood, *consolidation* of the inflammatory products in the lung tissue, and *softening* or breaking up of these products. The accompanying fever may kill during the first stage; as it is then at its greatest intensity. The animal may die of suffocation in the second stage, if a large amount of lung tissue be involved. The attack may prove fatal in the third stage by blood poisoning, owing to the absorption of diseased material thrown out by the lungs.

Symptoms.—Dulness and depression of spirits. Fever. Generally, shivering fits. Frequent pulse; often over 80 per minute (ordinary number, about 38). The breathing soon becomes rapid and "shallow," being sometimes over 40 per minute (natural rate, at rest, about 12 or 13), but without marked pain, unless when complicated by pleurisy. The cough, at first, if it be present, is full and strong, and very unlike the suppressed, painful one of pleurisy. When consolidation of the lung, however, takes place, the cough becomes small, as if proceeding from a solid body. The mucous membranes of the nostrils and eyelids are red, congested and, frequently, tinged yellow with bile. There is often, a slight, "rusty," yellow discharge from the nostrils. The eyes are bloodshot. The internal temperature is about 104° F. If the attack be but slight, the exudation may become absorbed before consolidation sets in, and the lungs may recover their healthy tone without further change.

If the horse does not succumb during the first stage, the fever gradually subsides; the pulse falls; the temperature becomes lower; the appetite returns; and the urine, before scanty, is now abundant. The rate of breathing, which had decreased with the abatement of the fever, now increases in rapidity, owing to the consolidation of a portion of the lung, thereby leaving a diminished amount of that organ with which to perform its function. In the third stage, the cough, if present, is moist and full. There is a free discharge of phlegm, etc., from the lungs, and, if the case ends favourably, the breathing becomes normal.

Pleurisy is inflammation of the pleuræ, which become dry during the first stage of the attack; hence, the observer, on applying his ear to the horse's side, may ascertain the presence of the disease by hearing the crackling, or "friction sound" caused by the dry and inflamed surfaces of the pleuræ rubbing against each other, as the lungs move backwards and forwards against the sides of the chest when the animal breathes. This sound somewhat resembles that emitted by two dry pieces of bladder when rubbed together. Owing to the pleuræ forming closed serous sacs, we always have, after an attack of pleurisy, an effusion of serum into them, constituting "water on the chest" (hydrothorax) of varying quantity. There is, also, an exudation of lymph, which becomes more or less organised on the pleuræ.

Symptoms of Pleurisy.—Pleurisy, generally, attacks only one side of the chest, that being the right, in most cases. At first, the symptoms usually resemble those of colic, except that the pain is constant and not intermittent, and there is inflammatory fever. The horse shows a great disinclination to move. There is considerable distress. In mild cases, the colicky pains are often absent. A shivering fit frequently precedes the attack. The affected side is tender to the touch. The breathing is quick and imperfect, and the flanks heave, which fact shows that the animal endeavours to breathe as much as possible by the action of the muscles of his abdomen, and not by the movement of his ribs, which are in close proximity to the inflamed pleuræ. The nostrils are dilated. There is usually a dry, short, painful cough present, which is repressed by the animal, as much as possible, so as not to shake the inflamed parts. Often, during expiration, the horse gives a painful grunt, especially, when he is made to move. The pulse is generally hard and frequent, or it may be weak and oppressed, and not much more frequent than usual. If the ear be applied to the affected side, the dry crackling or friction sound may be heard.

We may say that the three characteristic signs by which pleurisy, in its acute stage, may be recognised are : the peculiar friction sound heard on applying the ear to the affected side; the short, dry, painful, and suppressed cough ; and the abdominal breathing, made evident by the existence of a groove between the false ribs and the abdomen in the direction of the so-called point of the hip (anterior iliac spine).

In the second stage, the fever abates and the pain decreases. If there has been a considerable effusion of serum (causing hydrothorax or dropsy of the chest) the breathing becomes accelerated, owing to the mechanical impediment offered by the serum to the expansion of the lungs; " the pulse small, quick, soft, often intermittent; auscultation [observing the sounds given by the chest on applying the ear to the side] reveals absence of sound in the inferior part of the chest, or a sound resembling that of drops of water falling into a well." (*Williams.*) Dulness of the lower portion of the chest, which contains serum, may be observed on tapping the part with the tips of the fingers.

Bronchitis.—This disease is inflammation of the bronchial tubes. The lymph thrown out on the surface of the air passages may become organised, and may, consequently, cause obstruction to the air that is breathed, as may be indicated by the animal " making a noise," or by his becoming thick-winded. Infiltration may, also, take place into the substance of the lungs, causing the implicated part to become solidified, and, consequently, to lose its function.

Symptoms of Acute Bronchitis.—The breathing is very hurried but not painful, unless complicated by pleurisy. Frequent pulse. The lining membrane of the nostrils and eyelids is of a dark red colour, which may have a purple tinge from deficient oxidisation of the blood. The animal is dull and listless. The cough is full, soft and moist, except during the first stage, when it is dry, and differs in a marked manner from that of pleurisy, which is short, suppressed and painful. As the disease advances, there is a copious discharge from the nose. If the ear be applied to the side, a gurgling sound caused by the passage of air through the inflamed tubes, which are more or less blocked up with phlegm, may be perceived.

Epizootic Pleuro-Pneumonia.

See page 374.

General Treatment for Chest Diseases.

We may safely follow the teaching of Professor Williams, who strongly decries the severe practices of bleeding, blistering and purging in cases of pneumonia, bronchitis and pleurisy, and advises careful nursing and simple measures by which we may tide over the dangerous period during which the disease runs its course. Professor Williams' remarkable success in chest cases of the horse, for many years, affords unanswerable proof of the soundness of his views, which are in accordance with those, in human practice, of Dr. Bennett, who remarks, on the same subject, in his *Clinical Lectures*, as follows: "I think it has been further shown that in recent times our success in treatment has been great, just in proportion as we have abandoned heroic remedies, and directed our attention to furthering the natural progress of the disease."

In these complaints, there is great waste of tissue, which is shown by the rise in bodily temperature and by rapid emaciation; while, from loss of appetite, the animal will take little or no nourishment, nor, even if it be forced on him, can his system assimilate it. Hence, there is imminent danger of his sinking from exhaustion before the disease runs its course, and all the more reason for not weakening the animal by bleeding, which is powerless to modify the disease for the better. Besides this, the more the vital powers are left unimpaired, the less serious will be the after results.

As the skin of the chest and sides of the horse is very sensitive, highly endowed with the power of movement, and covered with hair; blisters applied to it produce great irritation, and a marked rise in the temperature of the body. In fact, by employing them, we but fan the fire which is consuming the animal.

A purgative should not be given in the diseases under notice; for one of its actions is to cause irritation of the mucous membrane of the intestines, which has close sympathy with that of the air passages, and is, consequently, in a more or less irritable state during these diseases, in which there is inflammation of the mucous membrane of the air passages, or of structures in close connection with it. Hence, if a sharp aperient be given, fatal superpurgation may be set up; or the diseases in question may be so seriously aggravated as to cause the death of the animal.

As the blood is the vehicle by means of which the waste materials of the body are removed, it becomes loaded with them, during inflammatory diseases, owing to the increased waste of tissue. When the blood is in this state, the various organs of breathing are unable to perform their respective functions with their normal facility, and, as the presence of inflammation also impedes the function of a part, it follows that we should direct our efforts, in these diseases, to maintain the purity of the blood. Hence, we allow a free supply of fresh air for furnishing oxygen to the lungs; we clothe the animal warmly and apply warm fomentations to encourage excretion from the skin; we give, to a moderate extent, diuretics, such as nitre, and sweet spirits of nitre, to act on the kidneys, the office of which is to remove waste material from the blood; a full supply of pure drinking water, to dilute the blood mass; and laxative food to act gently on the bowels.

We should keep up the strength by suitable food, and slight stimulants judiciously given. We may give

—but only then as a choice between two evils—opium to soothe pain. Aconite is sometimes useful to moderate the action of the heart.

Every means should be taken to avoid exciting the animal; for excitement will be followed by an increase in the rate of the beats of the heart, and a consequent strain on the inflamed organs. As heat is a sedative to the organs of breathing, the animal should be kept in a warm stall.

Practical Treatment.—The great secret of success is to take the case in time. The horse should be kept in a large, comfortable box, well ventilated, but entirely free from draughts. It is most important, in these cases, that the animal should be at once removed from a stable in which the air is vitiated. If the bowels be costive, give an enema of warm water. Foment the sides with warm water for a couple of hours, dry them, and, in order to prevent the part becoming chilled, rub in the following liniment:—

Soap liniment	½ pint.
Strong liquor ammoniæ . .	1 drachm.

The fomentation may be arranged by soaking a blanket in hot water, wringing it moderately dry, placing it over the back and sides, and then covering it over with a waterproof sheet, or dry blanket. Before the first blanket is removed, a second one should be got ready; and so on. The water should not be so hot as to inflame the skin; for a soothing, not an irritating effect, ought to be the desired object.

After the fomentations are finished, clothe warmly, so that the skin may act freely. Hand-rub the legs well, rub in some of the soap liniment, and put on straw or flannel bandages to reach above the knees and hocks.

Give the animal plenty of cold water to drink, and keep him quiet. Let the food consist of gruel, bran and linseed mashes, scalded carrots, hay, and some green grass or lucerne. Give an ounce of nitre the first day, and half an ounce in a mash, or in the water, on the following days; stopping it when the urine becomes abundant. Drenching should, if possible, be avoided, on account of its distressing the horse.

Professor Williams, in his lectures, strongly advises that, beyond the means I have detailed, the practitioner should do nothing, if he is not absolutely certain that the course he is about to pursue is the right one; that in cases of doubt it is well to wait and to watch symptoms; and that, if leaving the case to nature acts well, the animal should not be interfered with.

In these diseases, good nursing is the main thing, the administration of medicine being but of secondary importance.

When the pulse loses its hard character, give daily two drachms of carbonate of ammonia divided between three drenches, with a pint of water to each. If the horse will not eat, add two drachms of nitre to each drench instead of giving it in the food. The carbonate of ammonia strengthens the action of the heart, lowers the temperature of the body, and by its alkalinity tends to preserve the fluidity of the blood. If the carbonate of ammonia be not at hand, give an ounce of sweet spirits of nitre twice a day.

If symptoms of pleurisy be well marked and the pain be very acute, give—

Laudanum . . .	3 oz.
Linseed oil	½ pint.

If the symptoms of pain continue to be very urgent, we may subsequently administer 3 oz. of laudanum in a pint of water.

If, on the contrary, the symptoms of bronchitis be manifest, give in a ball—

Carbonate of ammonia . .	1 drachm.
Camphor	,,
Extract of belladonna . .	,,

twice a day. Steam the nostrils, and if the cough be hard, blister the throat with tincture of cantharides, or with the ordinary fly ointment. If the throat be sore, no ball should be given, nor the carbonate of ammonia in any form; as its effects on the throat are most irritating. In this case, a drachm each of belladonna and camphor mixed with treacle may be placed between the horse's teeth, twice a day, so that it may gradually pass down the throat.

I must caution the inexperienced horse owner to carefully consider the symptoms; and, if he is not quite certain what is the right course to pursue with regard to the *internal* administration of medicine, I would strongly advise him to dispense with it, and to content himself with following the general directions laid down, as regards fresh air, water, fomentations, warm clothing, laxative food, and nitre.

If there be great difficulty in breathing, which will occur when laryngitis is present, tracheotomy may have to be performed. Although this is a very simple operation; still it is generally advisable to defer it as long as possible, from the danger of its causing the horse to subsequently "make a noise," if the edges of the divided cartilage happen to unite in an irregular manner. When the animal's breathing becomes laboured, he should be carefully watched, and the operation performed the moment he begins "to fight for breath."

If diarrhœa sets in, it is not advisable to check it; as it is almost always an effort of nature to expel waste and deleterious matter from the system.

In the second stage, when the fever has passed off, corn should be gradually given, with, if much debility exists, a couple of quarts of beer a day, or skimmed milk with eggs beaten up in it. Discontinue the nitre, and give daily in a pint of ale—

Powdered gentian or chirretta	3 drachms.
,, ginger . .	2 ,,
Sweet spirits of Nitre .	1½ oz.

If the cough continues, blister the throat. Nurse the horse, and attend to his general health.

The liver is frequently implicated in an attack of different chest diseases, as will be indicated by the yellow colour of the gums and lining membrane of the eyelids. The practitioner should, however, neglect these secondary symptoms, and attend solely to the alleviation of the original disorder; resting assured, that, as it subsides, so will the liver symptoms gradually disappear.

Chest diseases are often far more serious than they appear to be at first glance. Hence, the person who has charge of the horse should use, when possible, the clinical thermometer (see page 575); for there is always, during the acute stage of these attacks, a marked rise in the temperature of the body, with a corresponding degree of danger to the animal. This instrument will not alone inform us of the extent of the danger; but will also give us timely warning of an attack, before the usual symptoms become apparent.

Congestion of the Lungs

Is usually caused by over-exertion, especially, when the animal is out of condition; by defective ventilation in the stable; and by chill. The distress is due to the lungs having become gorged with more blood than they can purify and return back to the heart. Death, in this disease, occurs from suffocation. More or less congestion always precedes inflammation of the lungs, and is, then, a transitory condition, and not a distinct disease in itself.

Symptoms.—The animal uses every effort to breathe. He stands with his fore legs wide apart, his head stretched out, his nostrils dilated, and he breathes with great rapidity; while his wild look, heaving flanks, bloodshot eyes, and trembling and sweating body denote the utmost distress. His legs and ears are cold. The mucous membrane of his eyelids and nostrils is of a more or less purple colour, on account of its vessels being filled with non-oxidised blood, which the lungs have been unable to purify. The veins over the surface of the body appear swollen. It often happens that some of the congested vessels of the air passages give way, and there is bleeding of the nose. The pulse is extremely weak, though frequent; and the artery feels very full. After a time, the animal becomes more or less insensible, from the action of the impure blood on the nerve centres.

"Cases of pulmonary congestion occurring in connection with other diseases, although the symptoms exhibited are seemingly less severe, are more generally fatal than when appearing as the result of over-exertion." (*Robertson.*)

Congestion of the lungs is frequently followed by inflammation of the lungs.

Post-mortem Appearances.—The lungs are swollen, dark-coloured and soft, and their substance is easily broken: appearances which might lead an inexperienced person to imagine that these organs were rotten and the disease was of long standing; when, in fact, the condition might become developed in a very short time.

Treatment.—If the disease is due to over-exertion in the open air, the rider should dismount, slacken the girths, take the horse under some shelter, turn him head to wind, cover him over with any clothing procurable, give him a quarter of a pint of spirits (such as whisky, etc.,) in a pint of water, give him water to drink, and hand-rub him well over, so as to draw the blood to his skin and away from his lungs. The spirits and water may be repeated after a quarter of an hour or twenty minutes. Two ounces of sweet spirits of nitre, or the same amount of tincture of arnica, may be used instead of whisky or brandy. If possible, place the legs in warm water, and use warm fomentations to the sides. If the symptoms be not relieved by these measures, bleed to the extent of about a gallon.

Alcohol in small and repeated doses tends to relieve congestion by quickening the general circulation, and, also, by stimulating the action of the skin. In large doses, it is extremely hurtful, in this disease; as it tends to diminish the number of pulsations of the heart, as well as the rate of breathing.

During convalescence, give laxative food, with ½ oz. of nitre mixed in it, daily.

Sore Throat (Inflammation of the Larynx and Pharynx).

Sore throat, usually, consists in inflammation of the mucous membrane which lines the larynx and pharynx. When the disease is confined to the former part, it is characterised by difficulty in breathing; when to the latter, by difficulty in swallowing. As simple inflammation of the pharynx is, as a rule, a mild disease which does not require any special treatment, the following remarks are made particularly with reference to the far graver one of laryngitis.

Symptoms.—The discharge of phlegm from the mucous membrane of the larynx, as well as the inflamed condition of the part, more or less closes up that passage, and occasions distress in breathing, "the inspiration being particularly prolonged, and attended by a peculiar harsh sound, succeeded by a short expiratory movement." (*Williams.*) This sound can be heard on applying the ear to the part. There is swelling of the throat under the jaws, and tenderness on pressure at this point. There is a strong, hoarse cough, the strength of which indicates that the expulsion of air from the lungs is made with ease; and the fact of the horse shaking his head from pain, after coughing, shows that its performance hurts him by reason of the air passing over the inflamed membrane. Breathing hurried. Lining membrane of the nostrils and eyelids red, and filled with blood. Nose poked out. Anxious and distressed expression of face. Eyes prominent. Considerable difficulty in swallowing; food and water being often returned through the nostrils. Discharge from the nose, and flow of tears from the eyes. In bad cases, cold sweats break out over the body. "The pulse, which may at first be hard and full, soon becomes rapid and indistinct, fulness generally remaining; the visible mucous membranes now assume a livid appearance from non-oxidation of blood; prostration of strength becomes extreme; the animal staggers, finally falls, and dies after a few struggles." (*Williams.*)

In simple pharyngitis there is very little constitutional disturbance. There is, however, great difficulty in swallowing, and a continued discharge of thick saliva from the mouth.

Principles of Treatment.—In this disease, the vessels that lie underneath the mucous membrane become distended with blood, which pours out a portion of its watery constituents into the substance of the mucous membrane, causing it to become soft and enlarged, and to discharge from its surface quantities of phlegm (mucus). These three conditions—congestion of the underlying blood-vessels, distension of the mucous membrane, and the presence of phlegm—cause distress in breathing, and more or less danger of suffocation by reason of the blocking up of the windpipe at this part. Hence, the rational treatment is, (1) to relieve the congestion of the blood-vessels; and (2) to facilitate the expulsion of phlegm. With the latter object in view, we cause the animal to inhale steam, either plain, or from water in which oil of turpentine or eucalyptus oil has been mixed; with the former, we stimulate the skin underneath the throat, hand-rub the legs, and clothe warmly, so as to draw the blood away from the inflamed part. We give belladonna to relieve the congestion of the blood-vessels so as to check the escape, into the tissues, of watery fluid from the blood. We prescribe nitre in order to diminish, by its action on the kidneys, the amount of blood there is in the system, and also, to maintain its fluidity, which nitre and certain other salts seem to have the power of doing, so as to facilitate the passage of the blood from the seat of inflammation. And, acting according to similar principles, we supply the animal with green meat and laxative food, not forgetting to support his vital powers after the virulence of the attack has somewhat abated.

Subsequently, blisters may be applied with the object of determining an increased supply of blood to the part, in order to cause the breaking up and absorption of any deposits which may be left as a result of the inflammation.

Practical Treatment.—Allow the horse a plentiful supply of fresh air. Clothe warmly. Hand-rub the legs, rub into them the stimulating liniment—

Soap liniment	½ pint.
Strong liquor ammoniæ . .	1 drachm.

and apply straw or flannel bandages.

Make the horse inhale steam from water, or from it mixed with turpentine, provided that it does not distress him. Foment the throat, and, after that is done, apply the above liniment. If the case be at all serious, blister the throat with tincture of cantharides. Give a drachm of the extract of belladonna twice a day; place it between the horse's teeth, instead of giving it as a ball, which would irritate the throat; or give the electuary of belladonna and camphor as prescribed on page 278; and give ½ oz. nitre daily, dissolved in the water or mixed in the food. Allow gruel, linseed tea, and linseed and bran mashes; substitute freshly-cut grass for hay. When the attack has subsided, the horse's strength should be kept up by gruel, and milk with eggs beaten up in it. Drenches and balls should not be used, as they would irritate the throat.

After an attack, it is perhaps the safest plan to blister the skin with biniodide of mercury, under the seat of the disease, three or four times in succession, and to put the horse on a course of iodide of potassium—one drachm twice a day—for a fortnight or three weeks.

In severe cases, tracheotomy is often the only means of saving the patient's life.

Catarrh or Cold in the Head

Is inflammation of the mucous membrane which lines the nostrils and air passages of the head. It is, generally, caused by exposure to cold and wet, aided by change of temperature. It appears to be capable of being propagated by infection.

Symptoms.—Catarrh is often ushered in by sneezing. The mucous membrane which lines the nostrils and eyelids is, at first, red and dry. This condition is soon followed by a watery discharge from these parts; which discharge, in a few days, becomes yellow, thick, and copious; especially from the nostrils, like what we ourselves experience in the latter stages of a cold in the head. There is more or less fever, dulness, and roughness of coat, with or without shivering fits. Cough is usually present, and may continue for some time after the other symptoms have subsided. Catarrh, generally, runs its course in about a fortnight, although it may induce a prolonged state of bad health in the animal.

Treatment.—Put the horse on bran and linseed mashes, and give freshly-cut grass or lucern. Allow a constant supply of drinking water, and give in it three-quarters of an ounce of nitre daily. Have the stable well ventilated, though warm, and keep the animal comfortably clothed. Make him inhale steam, either plain, or medicated with turpentine, from time to time, in order to facilitate the discharge from the nostrils. If the cough is troublesome and the breathing difficult, blister the throat with tincture of cantharides. If a milder effect be required, stimulate the part with equal parts of ammonia, turpentine and oil. Two drachms of camphor and a drachm of belladonna, made up into a soft mass with a little linseed meal and treacle, may be given every day; a little at a time being placed between the animal's back teeth, for him to gradually swallow. If the bowels be constipated, administer an enema of warm water, and give about a pint of linseed oil mixed up in, and divided between his mashes, for a day or two.

If, subsequently, there be great debility, the horse may have a couple of quarts of beer a day, and a drachm of sulphate of iron mixed, daily, in his food.

Cough

Is a symptom of various diseases, which, instead of the cough, should be specially treated.

I have alluded, under the proper headings, to the chief kinds of cough that are, respectively, characteristic of certain complaints, such as bronchitis, sore throat, pleurisy, broken wind, and roaring; so need only here remark on the condition which is popularly called "cough," on account of its exciting cause not being usually, apparent to persons uninstructed in medicine. These coughs may be roughly divided as follows.

1. *Teething Cough.*—This is due to irritation caused by teething, independently of chill. It may be distinguished by the fact that it is more violent in the

morning than during other portions of the day, and by its being continuous. It is of a "dry" character. Knowledge of the animal's age, and examination of his mouth, to see if his gums are in an inflamed condition, will aid us in determining its nature. The four-year colt is often affected in this manner. The *treatment* may consist in giving the horse soft food for a few days with half a pint of linseed oil mixed in it every day, while half an oz. of nitre may be dissolved in the water daily.

2. *Cough due to Chill.*—Some horses, from a naturally irritable state of their air passages, are very apt to develop a cough on trifling provocation. Although serious chest affections are often passed over as "merely cough;" still cough may be caused by an irritable condition of the air passages, without the occurrence of actual, or, at least, marked inflammation. The *treatment*, in such cases, may consist in warm clothing, avoidance of cold and wet, and feeding on green meat, and on bran and linseed mashes, with half an ounce of nitre daily in the water for a few days. No corn should be given. In India, four or five pounds of young bamboo leaves may be given daily with advantage. If these simple remedies be not effectual, give, morning and evening, the camphor and belladonna electuary (see page 278); and stimulate the throat with equal parts of ammonia, turpentine and oil. As cough often appears to be infectious, the animal should be removed away from his fellows, especially, if they are valuable cattle.

Race horses are sometimes liable to get coughs, if, after exercise, the hollow space between the branches of the lower jaw be not promptly and carefully dried. The practice of making horses wear "night caps" (short hoods) tends, I think, to bring on cough.

3. *Sympathetic Coughs* are, generally, owing to indigestion or worms, for which the animal should be specially treated.

4. *Chronic Cough* often appears as a result of sore throat, influenza, or acute bronchitis, or as an accompaniment of chronic bronchitis, which, excepting the cough, and, perhaps, a slight running from the nose, may present no other symptoms of ill-health to the casual observer. This cough is hard, dry, ringing and somewhat distressing. It is easily excited by exercise. In chronic bronchitis, a horse is always more or less "short-winded."

Treatment.—Give green food, and bran and linseed mashes. Carrots "are beneficial in all chronic diseases of the organs connected with breathing, and have a marked influence upon chronic cough and broken wind." (*Stewart's* "*Stable Economy.*") Blister the throat with biniodide of mercury, and if the camphor and belladonna electuary (see page 278) does not give relief, try a course of iodide of potassium as recommended for sore throat. Referring to arsenic, Mr. Finlay Dunn remarks, "I find it useful amongst horses in relieving chronic irritable cough, especially when remaining after attacks of influenza and sore throat. In such cases, with an ounce of Fowler's solution [liquor arsenicalis] is advantageously united an ounce of potassium chlorate, and a drachm of belladonna extract, made into a draught with water or gruel."

Broken Wind and Asthma

Appear to be used as a general term to denote "shortness of breath," connected with more or less emphysema of the lungs, which consists of a dilated condition of the lungs, due to an excess of air in the air-cells or in the cellular tissue that surrounds the lobules (see page 267). This continued dilatation prevents the lungs from becoming exhausted of air, at the end of the act of expiration, to their full extent, which fact causes the amount of air taken in to be less than it would be, were the lungs capable of being properly emptied. I may remark that, in any case, a certain amount (*residual air*) always remains in the lungs. When the distension occurs in the air cells—in which case, by the breaking down of their walls, the cells of the affected lobule tend to run into each other—the chief cause seems to be violent expiratory efforts made in the act of coughing. In the case, however, of distension existing in the connective tissue (*inter-lobular emphysema*) the entrance of air appears to occur during inspiration; the primary cause being, probably, some slow and long-continued degenerative change in the lung tissue. As a full condition of the stomach and intestines greatly interferes with the action of the lungs, it is not surprising that violent work, when the animal is "blown out" with food, and especially when his "condition" is not good, should be followed by emphysema of the lungs.

Owing, probably, to improved stable management, broken wind is now a rare disease. I venture to say that its most common form is chronic bronchitis, accompanied by emphysema of the lungs.

Asthma is a chronic diseased condition, which is characterised by paroxysms of distressed breathing that come on periodically, and which are caused by the spasmodic, and, more or less, continued contraction of the muscles that surround the small air tubes. This, consequently, interferes with the act of breathing, by closing, to a greater or less extent, these air passages.

The contraction of these muscles appears to take place during inspiration. The muscles which surround the small air tubes may become so developed, from continued exercise, that they may cause a permanent narrowing of the calibre of these passages. Owing to the action of the irritated nerves, the circulation in the lungs will become impeded, and we may have a certain amount of dropsy in these organs, on account of the increased exudation of watery fluid which escapes from the congested blood-vessels. These complications still further impair the function of breathing.

The chief causes of asthma are heredity, cold and damp climate, and foul air in stables.

In order to warrant the decision that a case of broken wind is due to asthma, the existence of paroxysms of distressed breathing, independent of any exciting cause, such as work, must be proved.

Damp, cold air greatly encourages the attacks of both asthma and chronic bronchitis.

Symptoms.—When breathing, air is taken into the lungs in a normal manner, but is expelled from them by two distinct efforts, the muscles of the abdomen forcibly aiding the completion of the act of expiration, as is made apparent by the heaving of the flanks. I may remark that, when at rest, there would be only one effort, strictly speaking; for tranquil and natural expiration is a passive act of elastic recoil. At the commencement of the attack there is a spasmodic cough, which is more or less intermittent. Later on, it becomes a single, weak, short, and suppressed cough, as if the animal had not power in his chest to give a full one, and is, generally, accompanied by an expulsion of wind from the anus. The difficulty of breathing (except at first, when there are remissions) is constant, but varies in intensity, being greatest after the horse is fed. The digestion and general health of an animal suffering from this disease are, generally, much out of order. Broken wind may come on suddenly.

Causes.—In the great majority of cases, this disease is brought on by the consumption of unsuitable food, such as chopped straw, hard and innutritious hay, and, particularly, by over-ripe rye-grass. These substances cause irritation to the nerves which go to the gullet and stomach as well as to the air tubes and lungs. It is instructive to remark that chopped straw—probably on account of the irritating effect of the sharp ends—is a fertile source of broken wind, as well as roaring; that long straw, also, gives rise to these affections, though to a far less extent; and that straw, bruised and broken up into a soft mass (see page 296), is free from objection on this point. Hence, it would appear that the injurious effect of certain foods in producing these complaints is due to their hard and irritating nature, rather than to their innutritious character.

The influence of heredity is well marked in this disease

Treatment.—The treatment can only be palliative. Feed and water by small quantities at a time. Give carrots. Substitute freshly-cut grass and lucern for dry hay. Bruise the corn and damp it, or, better still, mix through it a little boiled linseed, or linseed oil. Attend to the horse's general health and to the proper ventilation of the stable. Keep him short of food and water before being worked; though, when doing continuous work for some hours, small quantities of gruel or water, given occasionally, are of benefit. Total deprivation of water, at such times, is almost as bad as giving it in excess.

An ounce of liquor arsenicalis, increased up to two ounces, given daily in his food for a fortnight, might be tried. A pound of lard or butter, which may be given in balls, acts in abating the distress for a few hours. Horse copers, sometimes, endeavour to pass off a broken-winded animal as sound, by giving him, a short time before examination, a number of balls of fat, or a quantity of shot, which acts as a sedative.

Damp forage is recommended in this complaint. Professor Trasbot of Alfort, referring to palliative measures, remarks: "We will only cite damped hay, green food, and, above all, forage wet with molasses and water. This last regimen, employed often in the north of France, has given most satisfactory results."

Roaring.

Definition.—Roaring is a symptom of an obstructed condition of some portion of the air passages, which gives rise to noisy and more or less distressed breathing.

Varieties.—(1) The usual form of roaring is due to paralysis of one or both muscles which open the larynx. This is, probably, the cause in about 95 per cent. of cases of roaring. Under this "heading" we must include temporary instances of roaring due to pressure on the nerves of the muscles in question; and cases of hereditary predisposition in which, as it is averred by some authorities, the nervous supply to these muscles is absent from birth. Chronic lead poisoning is said to induce this form of roaring on account of its paralysing action on these nerves.

(2) An altered condition of the interior of the air-passages, which as a result of inflammatory action,

as from laryngitis or bronchitis, may have become rough and diminished in size.

(3) From the presence of tumours that are apt, from their position, to obstruct the opening of the larynx. These usually cause intermittent roaring.

(4) Alteration in the shape of the nasal cavities, from disease or injury. I have seen well marked cases of this form of roaring caused by a previous attack of osteo porosis.

(5) Irregular or imperfect union of the edges of the wound made into the wind-pipe by the operation of tracheotomy.

(6) The continued use of a very tight bearing rein is said to cause distortion of the larynx, so as to give rise to roaring.

Whistling.—When the noise of roaring is shrill, it is sometimes termed *whistling.*

Nature of the Paralytic form of Roaring.—The noise caused by this form of roaring is due, as has previously been remarked, to an imperfect action of the muscles (*crico-arytenoidei postici*) that open the larynx, owing to their becoming affected by a wasting nervous disease, which, usually, attacks the muscle of the left side only. On account of this muscular inability, the larynx cannot be opened to its full extent for the entrance of air into the lungs, during inspiration, which, consequently, is the period at which the noise is heard, and the distress in breathing experienced. The paralysis of the muscles is due to the wasting away of their nerves ; so that, according as this atrophy progresses, the affected muscle becoming less and less capable of being stimulated by its nerve, gradually withers away from disuse.

This nerve-atrophy appears to be due to pressure.

The well marked tendency of the left nerve (the left recurrent branch of the pneumo-gastric) to become affected in preference to its fellow, seems to be due to the fact that as it passes, in its course, from near the heart to the larynx, it closely approaches the bronchial and tracheal lymphatic glands, which, in the event of their becoming swollen, would exert injurious pressure on it. We may judge from our own experience, how easily the glands of the throat become swollen from cold, etc. The right nerve does not go near the glands of its side of the neck. It is possible that the left recurrent nerve may be subject to pressure during great exertion, and consequent violent action of the heart, on account of its position round the arch of the aorta. The right nerve is not placed in this manner. The fact is suggestive that a "roaring" respiration is a frequent symptom of aneurism of the heart in men. "According to Goubaux, the left recurrent must be situated more superficially than the right in the lower part of the neck, and for this reason should be more exposed to compression. He thus explains why, in chronic roaring, the alterations observed are nearly always in the left muscle of the larynx." (*Chauveau*).

Causes of "Roaring" Paralysis. (1) *Heredity* is the chief cause of this disease, which, once acquired, is extremely likely to be transmitted to the progeny of its possessors. Here, the influence of the dam is greater than that of the sire.

(2) *Diseases of, and affecting, the Organs of Breathing.* Among these, strangles seems to play the chief part. The influence of these affections would seem to be due to their liability to cause pressure on the left recurrent.

nerve by their action on the lymphatic glands close to where this nerve passes.

(3) *Indigestion* caused by irritation of the stomach, arising from the consumption of dry, hard food (see page 291). As the nerve affected in roaring is a branch of the great nerve (the pneumo-gastric) that, as one of its functions, influences the movement of the gullet and stomach; it is reasonable to suppose that the larynx will participate to some extent in ill-health of those organs. It is possible that the fact of the left recurrent nerve extending further back into the chest than its fellow, may be the cause of its being more readily affected than the other by indigestion. Under another heading, I shall consider the subject of dry food more fully.

Predisposing Causes of Roaring Paralysis.—(1) Heredity is not alone an active cause in itself; but is also a strong predisposing one; as we may see by the readiness horses with this taint in their blood, contract roaring under the trivial provocation of a slight cold, etc.

(2) *Cold, damp climate*, which seems to act by the influence it has in inducing diseases of the organs of breathing. The liability to contract roaring in a country, other things being equal, appears to be directly proportionate to the tendency in that climate to catch coughs and colds. Although roaring is met with among thorough-bred stock in the United States and Australia, it is found there to a less extent than in England. South Africa, and, I believe, South America are particularly free from this complaint, which is met in very few instances indeed in Egypt, Syria, Arabia, Persia, and India. Out of many thousands, I have known only two or three cases of

roaring among Arab horses, and about as many among Indian bred horses, scores of whose sires and some of whose dams have been confirmed roarers. I have known instances, in India of imported horses—and one case of a colt bred in India, whose dam, an Australian mare, was a roarer—who appeared to be confirmed roarers, become, after a time, perfectly sound in their wind. In India, I may mention, there is comparatively little liability to catch coughs and colds.

(3) *Stable Arrangements that are calculated to induce Coughs and Colds;* such as those which obstruct ventilation and give rise to draughts.

(4) *Excess of "Dry" Food.*—I approach this subject with great diffidence; for I am aware that in Syria, Egypt and other parts of the East, horses are fed for about ten months of the year, on barley straw, or wheaten straw, with a little barley, and that they do not, during that time, get any green food at all; yet these horses are hardly ever known to turn out roarers. The straw (*tibben*), however, during the native process of thrashing, becomes bruised and broken into short pieces, and is thus rendered quite soft. I have known instances, however, in these countries, of several horses turning roarers when fed on chopped straw (the ends of which may have an irritating effect on the mucous membrane of the mouth, gullet and stomach), instead of on *tibben*. It is only fair to say, however, that the animals were importations from countries in which roaring is not uncommon. Many experienced stablemen in England consider that hay given in large quantities is a well-marked cause of roaring, especially, if it contains a considerable proportion of rye-grass, or if it has an excess of woody fibre. I may remark,

in passing, that good hay should be green, not brown. Heavy cart horses in Scotland and in the North of England are almost as subject to roaring, as are thorough-breds ; the cause seeming to be that they are fed on quantities of dry, hard straw. I think that experience will justify the remark that, other things being equal, horses fed on green grass, are not so liable to turn out roarers, as are those which get hay or chopped straw. In India, the large majority of horses are fed on grass, the best kind of which is sweet, nutritious, and comparatively dry. The feeding of horses on hay in India does not appear to induce roaring.

(5) *Violent Exertion of the Organs of Breathing.*—It goes without saying that the more any organ is overtaxed, the more liable will it be to become diseased.

(6) *Breed.*—The more of the English thorough-bred blood there is in a horse, the more likely is he to roar. The reason for this seems to be that this breed, above all others, has suffered during a long succession of years, from the causes best calculated to establish a strong hereditary predispositon : namely, residence in a cold, damp climate, such as that of England ; living, in too many instances, in heated and ill-ventilated stables ; being constantly fed on highly stimulating food ; and habituated to perform labour demanding extreme exertion of the organs of breathing. The influence of breed, therefore, might be classed under the heading of "heredity."

7. *Size of Horse.*—The paralytic form of roaring is, essentially, a disease of large horses. Although ponies are as liable to become broken-winded as are big animals, they very seldom, indeed, contract this form of roaring. We find among own brothers and sisters

who have a hereditary taint, and who are, say, 15-2 or over, that the bigger the individual animal, the more predisposed is it to roar. The only explanation of this which I can offer, is that the smaller the horse, the quicker is the circulation of blood, and, consequently, the readier will be removed from the system any diseased products formed during an attack of catarrh, strangles, etc., which might become absorbed into the lymphatic glands of the neck, and thus give rise to injurious pressure on the left recurrent nerve. No breed of pony, as far as I know, possesses absolute immunity from roaring, which I have observed in English, Australian, Arab, East Indian and China ponies.

Symptoms.—In paralytic roaring, when the sound is heard, it is harsh and occurs during inspiration. Some observers say that it may, also, but to a much lesser extent, be noticed during expiration. In cases due to the presence of movable tumours, it would, likewise, be probably heard during inspiration. In instances of mechanical obstruction, we may presume that it would be more pronounced during expiration; as then the current of air is stronger than during the reverse action. In mild cases, the objectionable sound is, usually, not apparent, unless the animal is put to a fast pace. At the commencement of the affection, it is often heard only at the beginning of exercise, and wears off as the work is continued. If it is worse at the end of a gallop than at starting, the horse may be regarded as a confirmed roarer. Some horses roar so badly that they "make a noise" when only walking, and even when standing still, without having been exercised.

The roarer has, generally, a deep, sepulchral, or "churchyard" cough, which is characteristic of the malady.

A horse that *grunts*, whether when suddenly startled, or when jumping, should be looked upon with great suspicion as to his being a roarer; for if this habit of grunting is not actual proof of roaring, it points to a strong tendency to that complaint, in the great majority of cases, or to some marked defect in the organs of breathing.

As a great rule, a roarer gets worse and worse with age.

Some horses that are not roarers, are apt to make a noise when pulling hard at their bridle, on account of opening their mouth and drawing back their tongue, by doing which they force back the soft palate, so that it partly blocks up the air passage between the nasal cavities and the larynx. We may remedy this by tying down the tongue with a piece of tape passed round the lower jaw, or we may close the mouth by a tight nose-band.

Testing a Horse's "Wind."—If the horse is a saddle animal, he should be sent a strong canter or gallop on soft ground, so as to "open his pipes" and to allow the examiner to observe the nature of his breathing. After passing near to the examiner, say a couple of times, he should be pulled up sharp and brought to him, so as to enable the examiner to apply his ear close to the animals nostrils, so that he may detect any peculiarity in the breathing while the horse is "blowing hard." Any roughness of sound during inspiration should be sufficient to at once condemn the animal. We can note the nature of the breathing much more accurately when riding the horse than when listening to him as he passes us on foot. A similar procedure may be adopted with a harness horse, which should be driven on soft ground. When testing the wind of a heavy cart horse, we should make him fully exert his powers by moving a big load. If this be not available, we may improvise a drag by locking the hind wheels of the cart by means of a stout pole passed between their spokes.

When we are unable to put the horse to severe exertion, in order to facilitate our task of observing the nature of his breathing, we may "grunt" him by catching him sharp by the head with one hand, and suddenly threatening to strike him under the belly with a stick or whip ; when, if he is a roarer, he will, in the large majority of cases, grunt. The effect is best produced when the animal, before being threatened, is placed, so that he may not wheel round, alongside a wall, the portion of that which is reserved for this purpose, at Tattersall's, is covered with a sheet of India-rubber, so that the horse may not hurt himself by knocking up against the wall. Professor Williams remarks on the difficulty of making roarers cough by pressing their larynx with the fingers. Hence, after proving that a horse does not grunt, if we find that he coughs readily and in a healthy manner, when we squeeze his larynx between the finger and thumb, we may be fairly confident that his wind is all right.

Roarers as Stud Animals.—Owing to the very strong influence of heredity in this complaint, a mare or stallion that is affected by roaring, should on no account be used for stud purposes in Great Britain, or in any other country in which the climate is at all favourable to the development of this complaint. I can see no objection, however, to breeding from roarers in countries like India and South America, the climate of which is unfavourable to its propagation. Dr. Fleming remarks on the fact that hereditary influence of a roaring stallion in conferring this affection on his progeny, will usually increase with age.

Medical Treatment of Roaring.—The only medical treatment which appears of any use is the administration of iodide of potassium ($\frac{1}{2}$ oz. a day in the food or water), and the application of Faradic electricity. These agents are useful only in the very early stages, or to prevent an increase of the malady; for they are powerless to cause the renewal of wasted muscular tissue. Dr. Fleming advises that the current should be applied to the nerve on its course in the jugular furrow; and that the application should be made for some minutes, in a mild degree, several times a day.

As regards stable management, I would suggest that the roarer should have a daily allowance of linseed, say, one pound, or 4 oz. of linseed oil as its equivalent. The linseed may be given in the form of linseed meal mixed through the food; as linseed tea; or as a linseed mash. Grass, when it can be obtained of good quality, should be used instead of hay. I cannot speak from my own experience of the advantages of damped forage, as has been recommended for broken wind. "I have no doubt that roarers might be improved a stone if they were trained from an open shed, sheltered from wet and rain, keeping them warmly clothed and always in the open air." (*Admiral Rous.*) I have never seen any good results from the practice of giving race-horses that were roarers, just before starting, butter, oil, etc., with the object of lessening their infirmity of breathing. Such animals will often make much less noise when "fit," than when out of "condition."

To modify the admission of air into the lungs, Mr. Reeve has suggested the use of a strap to pass over the false nostrils of the horse. This strap is fixed to each side of the bit, and is kept in position by a strap at each side attached to the head-stall of the bridle. "To the inner surface of this strap, immediately over the false nostril at each side, was fixed a body resembling in shape the half of a hen's egg cut longitudinally; when applied, these bodies pressed upon the triangular space formed by the apex of the nasal bones and upper jaw, thus closing the false nostrils, and partly dimishing the channel of the new ones." Although the employment of this strap has been ruled to be cruelty to animals; still it appears to greatly ease the breathing of roarers. It seems that the air which enters the false nostrils, causes some amount of obstruction in the true nostrils. The Eastern practice, especially applied to donkeys, of slitting up the false nostrils may not be altogether without reason.

A certain amount of relief has been found, in some cases, from the employment of a tracheotomy tube in the wind-pipe of a roarer. This expedient might be suitable for temporary use.

Dr. Fleming's Operation for Roaring.—Various veterinary surgeons on the Continent, commencing with Günther, of Hanover, in 1834, have endeavoured to relieve the distress and noise of paralytic roaring by operations on the larynx. Their efforts were attended by such ill success, that the operation was practically given up, until Dr. Fleming revived it, and introduced some original details of his own. I may remark that the operation consists in the removal of the whole of the left arytenoid cartilage and of the left vocal cord. I may add that Mr. Raymond, A.V.D., who has been Dr. Fleming's assistant in working out the practical details of this operation, says that it is sufficient to cut through the crico-thyroid, the cricoid cartilage, and the crico-tracheal membrane. He does not cut through any of the tracheal rings. As the details of this operation are beyond the scope of this article, I beg to refer my readers for all further information, to Dr. Fleming's book, *Roaring in Horses*.

I may remark that no operation which necessitates the removal of tissue from the inside of the larynx is likely to prove of permanent use in the alleviation of roaring; for distortion of the tube is almost certain to take place, owing to the contraction which the wound will undergo on healing. Besides, the mere removal of the obstruction can have no curative effect on the nervous disease which gives rise to it, and which often injuriously affects the lungs.

Thick Wind.

This term signifies an impaired condition of the horse's powers of breathing, unaccompanied by noise, or by any peculiarity during inspiration or expiration. When put to fast work, or to violent exertion, his breathing comes more accelerated, and he himself more distressed than ought to be the case were his organs in a healthy state, taking into consideration his working "condition;" and his flanks continue to heave for a long time after he has ceased labour. This state is, usually, the result of thickening of the bronchial tubes, owing to a previous attack of bronchitis, and is often accompanied by a chronic cough. Palliative treatment, similar to that recommended for broken wind and roaring, might be tried.

Highblowing

Is not a disease, but is simply produced by the flapping of the horse's nostrils when he expels air quickly from his lungs. The larger, thinner, and more delicate the nostrils are, the easier will it be for the horse to make this noise, which appears to be under his control. It is rarely heard, except at the canter or half-speed gallop, and seldom when the animal is "doing all he knows." It is generally considered to be a sign of good wind. One can imitate the sound, near enough to understand how it is made, by bringing the lips of one's mouth lightly together, and then blowing moderately strong through them. If one blows hard, the vibratory noise is not made. I have mentioned this subject of highblowing; as it is sometimes mistaken for roaring by inexperienced people.

CHAPTER XII.

Diseases of the Digestive Canal.

INFLAMMATION OF THE MOUTH AND TONGUE—COLIC—SPASMODIC COLIC—FLATULENT COLIC—FLATULENT DISTENSION OF THE STOMACH—INFLAMMATION OF THE INTESTINES, OR ENTERITIS—TWIST OF THE INTESTINES—INFLAMMATION CAUSED BY THE EATING OF SAND—IMPACTION OF THE STOMACH OR STOMACH STAGGERS—RUPTURE OF THE STOMACH — GRASS STAGGERS — SUPERPURGATION—DIARRHŒA—CHRONIC INDIGESTION — CONSTIPATION —INTESTINAL WORMS—BOTS—CRIB-BITING AND WIND-SUCKING — LAMPAS — CHOKING—PROLAPSUS OF THE RECTUM—CALCULI AND CONCRETIONS IN THE BOWELS.

Inflammation of the Mouth and Tongue (*Aphthæ, Pustular Stomatitis*).

The chief forms of inflammation of the mouth and tongue which we, usually, note in the horse are : 1. A superficial eruption on the mucous membrane, after certain diseases, somewhat similar to that we may see on the lips of a man, at times, during the convalescent stage of intermittent fever. 2. An inflammatory peeling off, in patches, of the mucous membrane of the mouth and tongue ; with, perhaps, the formation of a small amount of matter, at parts where the sores are deep. I may mention that these two forms come under the head of *aphthæ*. 3. A contagious inflammation (*pustular stomatitis*) which extends all over the mouth and tongue, and, generally, to the nostrils, as well as to the face, and even to other parts on which the discharge may fall. The eruption consists of small nodules, or boils, which ulcerate, and run their course, as a rule, in about a fortnight. A good deal of discharge, and some swelling of the parts, accompany the inflammation. The ulcers lack the chancre-like appearance of those of glanders. The disease may be communicated to cattle and man. In some instances, the horse has seemed to have received it from cattle, in which case it would appear that contact with the discharge, left, perhaps, on fodder, would be sufficient for the propagation of the virus, without abrasion of the surface of the mucous membrane.

The *treatment* would consist in frequent bathing of the part with a solution of 1 oz. borax, in 4 oz. glycerine, and 2 oz. water; or of a saturated solution of borax, or alum in water. The animal should be carefully nursed, and have " soft " food to eat. Abundance of linseed tea would be an appropriate drink. In the contagious form, we might give *liquor arsenicalis* (see page 515), to act on the disease germs. In all cases, 2 oz. of bicarbonate of soda, mixed in the food, would be advisable.

Colic.

Colic being the manifestation of pain in the interior of the abdomen, is a symptom of various diseases, such as : irritation of the intestines, due to the presence of undigested food ; distension of the intestines by gas ; enteritis ; hernia ; twisted bowel ; calculus in the intestines; obstruction ; etc. Hence, when a horse is seized with an attack of colic, the person treating him should endeavour to find out the nature of the disease, so that he may try to remove the cause, and not endanger the life of his patient by losing valuable time in attempting to alleviate the mere symptom of pain.

Spasmodic Colic

Is the term applied to spasm of the muscular coat of the intestines, generally caused by irritation due to the presence in them of undigested food. It may also be caused by chill. It is usually brought on by injudicious watering and feeding, especially, when the horse is exhausted from hard work and long fasting; for the digestive apparatus is then in a weakened state. Some animals, from natural or induced weakness of these organs, are prone to colic at all times, unless very carefully managed. This form of colic is practically unknown among horses that are properly fed and looked after.

Horses that are subject to colic without ostensible cause, should be regarded with extreme suspicion; for such attacks are often indicative of the presence of calculi (balls of earthy or other indigestible matter) in the bowels, or of other grave affections.

In England, spasmodic colic is generally due to spasm of the small intestine; in Scotland, to that of the large bowel, which becomes obstructed by the excess of woody fibre contained in the grass of that country. Hence, as we shall see further on, it is safer to give a purgative in cases of spasmodic colic in England, than in Scotland.

As mistakes are liable to be made in deciding whether the attack is one of colic or inflammation of the intestines (enteritis). The person in charge of the patient should carefully study the symptoms of both diseases before deciding on a doubtful case.

Entire horses, when suffering from colic, especially when they show a tendency to lie on their backs, should be examined for hernia.

Symptoms.—The first symptoms, usually, are: uneasiness and looking round at the flank, or attempting to lie down. As the attack proceeds, the animal may cow-kick at his belly, or seek relief from the pain that has seized him, by rolling on the ground. During these times his pulse will be quick, breathing laboured, and body more or less covered with perspiration. There are distinct intervals of freedom from pain; the commencement of an intermission being, perhaps, marked by the horse starting up on to his feet—after rolling and struggling—and beginning to walk round his box, feed, or look about, as if nothing had occurred. Another attack soon comes on again, with more or less violence; and the pain gradually passes off, or the animal dies from exhaustion, or from some complication. While the pain lasts, the skin over the abdomen is not sensitive as it is in inflammation of the bowels; and pressing and rubbing it seems to soothe the patient. During the intervals of rest, the breathing, pulse, and skin are natural. During the periods of pain, the pulse is frequent and *full*. The best distinguishing symptom is that the pain is intermittent. If the body continues wet with sweat, the case may be deemed a very serious one. The act of staling in a normal and easy manner is a most hopeful sign.

Treatment.—Mr. Gamgee taught that colic being due to the presence of some undigested irritating substance in the bowels, its rational treatment is removal of the offending matter by purgatives and enemas. This practice, however, is not always safe; for if the pain be due, for instance, to impaction, as in the case of prolonged constipation, and not to undigested food recently consumed, fatal results might arise from the administration of a brisk purgative, which would be followed by a copious discharge of watery fluid into the intestines, from which, owing to the existing obstruction, it might not be able to force its way, without causing fatal injury to the bowel. Besides this, a dose of aloes will unfit a horse for work for a few days. The employment of an antispasmodic, such as turpentine, chloric æther, chlorodyne, or even alcohol, is as rational as that of a purgative ; for the former, as well as the latter, stimulates the intestine to get rid of the offending material, without, however, causing the discharge of watery fluid.

I would advise the non-professional owner to give, in ordinary cases, the following drench :—

Laudanum	2 oz.
Turpentine . . .	2 ,,
Linseed oil	1½ pints.

Some practitioners prefer an ounce of chloric æther to the turpentine in the above draught.

I may remark that the linseed oil acts most usefully as a gentle aperient which does not cause watery evacuations, and as a vehicle for the turpentine. The opium allays pain ; and the turpentine checks the formation of gas, and stimulates the motion of the intestines. If no other drugs be at hand, 3 oz. of turpentine may be given with the oil, or in gruel (as a drench), if the oil be not procurable.

If relief be not obtained, administer a dose of aloes, and, if necessary, give 3 oz. of laudanum in a pint of water. Above all things, we should exercise patience, and should refrain from giving opium or its tincture (laudanum) repeatedly.

The following is a useful ball for colic, especially, in Asiatic countries where its component drugs are, as a rule, easy to be procured.

Opium	1½ drachms.
Asafœtida.	1 ,,
Camphor	2 ,,

If, in the first instance, nothing else is to be had, we may give a quart of warm ale, fortified by a glass of spirits and a tablespoonful of powdered ginger; or, better still, an ounce of chlorodyne in a pint of cold water.

The horse should be kept quiet in his stall, with plenty of bedding under him, and should not be distressed by exercise. He may have one or two enemas of warm water; and his abdomen may be fomented or well hand-rubbed. He should be kept warm. A catheter should be passed, if the bladder is full.

Flatulent Colic.

This dangerous form of colic is due to the distension of the bowels by gas, resulting from the decomposition of undigested food contained in them. It sometimes follows spasmodic colic; in which case, we have, in the first instance, spasm due to irritation set up by the presence of undigested matter; and, subsequently, distension, owing to its decomposition.

We may readily conclude that flatulent colic is caused by errors in feeding and watering the horse. Perhaps, he has been given a quantity of rank grass, watery roots, or boiled grain, which, on account of its moist nature, is quickly swallowed without being properly masticated; the gastric juice, being too largely diluted by the fluid portion of the forage, performs its office imperfectly; decomposition takes place; and the bowels become filled with gas. Or, the thirsty horse, after feeding, may have had a draught of water which may have diluted the gastric juice to an injurious extent, or may have checked its secretion by chilling the stomach, and we may get a case similar to the one just described. Or, the horse may have been worked soon after being fed. Here the muscular labour may check the secretion of gastric juice, and arrest the movements in the stomach which are necessary to digestion; distension and colic being the probable results.

Horses that are fed on large quantities of boiled food, frequently become chronically disposed to attacks of flatulent colic, from the fact of their stomach having become weakened from continued over-distension.

In Northern India, horses are generally fed on a kind of pea, called *gram*. As it is hard and dry, some persons ignorantly consider that it should be well soaked in water before being given to the horse. If this be done, the grain is imperfectly masticated, and the *bolus* of food, instead of being thoroughly mixed with saliva before entering the stomach, in which state it would have been ready for reception by that organ, is simply saturated with water. Sometimes, the grain is steeped so long that fermentation actually commences in it before it is given to the horse. I need hardly say that this system of feeding is a fruitful source of indigestion, and a not uncommon one of colic.

Watering after feeding was, some years ago, a not unfrequent practice in batteries of artillery and regiments of cavalry in India, and was, of course, attended by many cases of colic, with instances of rupture of the stomach, now and then. I am glad to say that such barbarous methods are falling into disuse in that country. Watering after feeding is particularly dangerous when gram is used; as that grain readily ferments on being soaked in water.

Symptoms.—The symptoms resemble those of spasmodic colic, except that they are less violent, though much more continuous, and there is considerable distension of the abdomen. The breathing is difficult, and there is more or less delirium in bad cases.

Great distension of the abdomen is often a sign of a fatal termination of different diseases, as in superpurgation, for instance.

Laminitis sometimes ensues after an attack of this form of colic.

Treatment.—Give the drench recommended on page 309.

Medicines in a solid form, though appropriate in spasmodic colic, should not, generally, be given in flatulent colic.

We may repeat the tincture of opium in doses of 2 oz. in half a pint of water, once or twice; foment the belly; and give an enema of half a gallon of warm water. Instead of the foregoing drench, we may give, in a pint of water, ½ oz. of Jeyes' Fluid, the action of which is to check decomposition of the food. Being less irritating, Jeyes' Fluid is, here, much better than carbolic acid.

Hand rubbing the abdomen will afford relief. I would advise that the horse should not be back-raked, and that not more than two enemas should be given, lest the part be made so sensitive and irritable that the animal will be afraid to pass wind.

If medicines fail to overcome the attack, the intestines may be punctured in the manner described by MM. Peuch and Toussaint, from whose work on

Veterinary Surgery I have abridged the description given among "Operations" (see page 569).

Flatulent Distension of the Stomach.

The return of food, or the belching of gas, from the stomach of the horse, is almost completely prevented by the gullet forming a kind of valve which opens inwards, at the entrance to that organ. Under ordinary conditions, *chyme* (see page 496), and any superabundant gas, obtain ready escape from the stomach into the intestine; the unprepared portion of the food being kept back, by closure of the orifice due to the irritation which such food causes to it. We may, also, have this portion of the intestine, as Mr. Fred Smith points out, closed by a distended stomach pressing on it; especially, as it forms, at this orifice, an S-like curve. The fact of vomition being, practically speaking, impossible to the horse, as a healthy means of relieving the stomach; he is rendered by this inability, peculiarly liable to rupture that organ; an accident which is, not unfrequently, the fatal termination of the disorder we are considering.

The usual *cause* of this complaint, is the eating of food which is liable to ferment in the stomach, especially, when it has been imperfectly masticated. Wind sucking, and stricture, or blocking up of the gut, by a calculus, at its exit from the stomach, may, also, give rise to it.

The *symptoms* are those of very aggravated colic. There is a certain amount of distension of the bowels, though not to the same extent as in flatulent colic. "The tympany [gaseous distension] is plainly seen to be *under the ribs*, forward in fact; the animal may now stand persistently with the elbows turned out to increase the capacity of his chest; a gurgling sound is heard in the œsophagus due to eructations of gas, followed, perhaps, by vomiting; saliva flows from the mouth; the expression is one of the greatest anxiety; head symptoms may now appear." (*Mr. Fred Smith.*)

The *treatment* should be the same as for flatulent colic. It is well to puncture the intestine (see page 569); so as to favour the escape of gas from the stomach.

Inflammation of the Intestines (*Enteritis*).

Definition.—Enteritis is inflammation of the mucous membrane which lines the intestines.

"I hold the opinion that many of the so-called cases of enteritis are nothing more or less than strangulation from twists partial or complete, and that enteritis, pure, simple, and uncomplicated, is comparatively, a rare disease in the horse." (*Mr. Fred Smith.*)

This disease generally proves fatal, and usually runs its course in a few hours. Little is known concerning its true nature. It is possible that the absorption of disease germs (see page 353), from the undigested portion of food in the intestines, may give rise to the peculiarly distressing and dangerous symptoms; for it seems highly improbable that mere inflammation would kill as quickly as enteritis does. I may remark that surfaces which, when in a healthy state, successfully resist the action of disease germs, may when inflamed, readily allow them to become absorbed. This is, probably, equally true of pneumonia, bronchitis, catarrh, influenza, and other complaints, as it is of inflammation of the intestines.

The attack, sometimes, appears to come on without any assignable cause. It may be a termination of colic, as irritation is always liable to set up inflammation. Professor Williams states that the only recognisable causes are over-fatigue and chill. Laminitis may follow an attack of enteritis.

Symptoms.—As all inflammations of the mucous membranes are characterised by a tendency to spread over the entire mucous surface, we find that, in this disease, the membranes of the eyelids and nostrils have an abnormally red appearance; the expression is very anxious; internal temperature higher than usual; pulse wiry (small and hard) and frequent, often reaching to over 100 beats in the minute (natural pulse about 38.) The pain is continuous, without the remissions so characteristic of colic. Pressure on the abdomen with the hand gives pain. In the first stages of the attack, the horse shows that he is averse from pressure on the belly, by the careful manner in which he gets down on the ground to roll, and by the way he kicks at, or pretends to kick at, his abdomen. "The continuance of this torturing pain drives the animal to a state of extreme restlessness and distress; he is either pawing, or repeatedly lying down and rising again; or else he is walking round his box, breathing hard, sighing, and perhaps occasionally snorting. At length his respiration becomes hurried and oppressed; his nostrils widely dilated; his countenance painfully anxious and expressive of his sufferings; his body bathed in sweat at one time, but at another cold, and occasionally seized with tremor; and his tail erect and quivering.

"The next stage borders on delirium. The eye acquires a wild, haggard, unnatural stare; the pupil dilates; his heedless and dreadful throes render approach to him quite perilous; in short, he has become an object not only of compassion but of apprehension, and seems fast hurrying to his end; when all at once, in the midst of agonising torments he stands quiet, as though every pain had left him, and he were going to recover. His breathing becomes tranquillised, his pulse sunk beyond all perception; his body bedewed with a cold, clammy sweat; he is in a tremor from head to foot, and about the legs and ears has even a death-like feel. The mouth also feels deadly chill; the lips drop pendulous; and the eye seems unconscious of objects. In fine, death, and not recovery, is at hand. Mortification has seized the inflamed bowel; pain can no longer be felt in that which but a few minutes ago was the seat of exquisite suffering." (*Percivall.*) There is, generally, more or less distension from the evolution of gas in the intestines.

Distinguishing Signs between Enteritis and Spasmodic Colic. — As inflammation of the intestines may be mistaken for spasmodic colic, I may state that the chief differences between the symptoms of the two, is that, in the latter, the pain comes on in paroxysms, between which there are intervals of ease; the pulse, breathing, skin, and mucous membrane, are almost, if not quite, in a normal condition during these periods; rubbing and pressing the belly with the hand seem to ease the pain; and the animal appears to obtain temporary relief from rolling on the ground. In enteritis, the very reverse of all this is the case; the mucous membranes are abnormally red, and the skin, in the later stages, colder than usual. During the paroxysms of colic, the pulse is frequent and *full,* not frequent and *wiry* (small and hard), as in the other disease.

Principles of Treatment.—The following appear to be the correct principles of treatment: (1) Give to the inflamed part rest, which is best accomplished by opium; as that drug has a special action in arresting the motion of the intestines. (2) Administer a strong sedative to allay the pain which threatens the life of the animal, and to allow him to tide over the attack, for which purpose opium is also suitable. (3) Check the action of diseased germs, or, at least, of decomposing food in the bowels, as may be done by Jeyes' Fluid or carbolic acid.

Treatment.—Give ½ oz. of opium, or 6 oz. of laudanum. A pint of linseed oil, with 6 drachms of Jeyes' Fluid dissolved in it, may also be given with advantage.

The body may be fomented with warm water, and an enema of the same fluid may be administered.

During convalescence, care should be observed concerning the horse's food, which may consist of small quantities of bran and linseed mashes, with a few scalded carrots and a little grass after a time. Dry food should be avoided.

Twist of the Intestines.

The following remarks on this accident have been chiefly compiled from Mr. Fred. Smith's pamphlet on this subject.

Both the large and small intestine may become twisted in various ways. The chief *causes*, according to Mr. Smith, are: violent struggling on the ground during paroxysms of colic, and over-distension of the bowel with gas. Never having seen a single instance of twist of the intestines caused by struggling on the ground, however desperate it might be, in many hundreds of cases of horses which I have made lie down in horse-breaking experiments, I am strongly of opinion that these violent movements never induce twist of the bowel; unless, possibly, the relative positions of its parts are altered from their normal condition by some unusual cause, such as distension. Hence, in ordinary spasmodic colic, without flatulence, I see no objection to allowing a horse to roll.

The *symptoms* are: violent and continuous colicky pains; flatulent distension of the belly, in cases in which the obstruction is more or less complete; as a rule, obstinate constipation, after the portion of the bowel, behind the obstruction, has cleared itself out; and, as the case may be, a displaced condition of the large intestine, which may be felt, on an examination being made through the rectum.

The *appearances after death* are: an abruptly commencing discoloration of the strangulated bowel, which may be red, blue, or black, according to the degree and duration of the congestion; and a thickened condition of the affected intestine. These changes affect the entire thickness of the bowel, that is, the mucous, muscular, and peritoneal coats. When the abdomen is opened, the twist, usually, becomes undone; so that there is nothing to mark its previous existence, except the discoloration.

Treatment.—If there be flatulent distension, puncture the intestine (see page 569) on the side at which the swelling is most tense. Give 1 oz. of extract of Cannabis Indica; ¾ oz. of opium; 8 oz. of laudanum; or inject hypodermically (see page 574) 10 grains of morphia.

Inflammation caused by the Eating of Sand.

When horses are bedded down with sea sand, or with river sand which contains saline matters, they are very liable to eat large quantities of it, and, consequently, to suffer from a most dangerous form of inflammation of the intestines. Many instances are on record of troop horses having become thus affected after having been picketed on sand. Inflammation may, also, be brought on by the presence of irritating materials in the food. "In the death-reports it is constantly remarked what large amounts of gravel and indigestible rootlets are found in the intestines, which have been introduced with the grain and grass." (*Veterinary Returns of the Madras Army*.)

In some cases, morbid appetite may account for the propensity. A certain proportion of healthy horses will always—particularly, if they have not had a free supply of salt—eat sea sand when bedded down with it. The precautions to be observed are obvious.

Horses have been known to eat, with, naturally, fatal results, quantities of 80 lbs. and upwards of sand.

The *symptoms* are intense colicky pains, and the passage of sand, etc., with the dung.

The *treatment* consists in keeping the animal on mashes and boiled food, through which about four ounces of linseed oil should be mixed at each feed; and the pain should be allayed by 2-oz. doses of laudanum given in a pint of water. No attempt to get rid of the sand by purgatives should be made; for, if this be done, the gritty particles, on becoming forcibly impelled through the bowels, would wound them, and, consequently, would set up inflammation to an almost certainly fatal degree. A few copious enemas (see page 554) may be tried with advantage.

Impaction of the Stomach, or Stomach Staggers.

In this condition, the stomach becomes gorged with food which it is unable to get rid of. The practice of feeding horses on large quantities of boiled food predisposes these animals to this complaint, as well as to rupture of the stomach; for soft food is rapidly swallowed without being properly mixed with saliva, and is, consequently, more difficult of digestion than if it had been thoroughly masticated, and is also more liable to ferment and cause the evolution of gas. The resulting distension strains the muscular wall of the stomach and renders it thin and weak; in which state, it is incapable of efficiently performing its office of churning up and finally expelling the food; and the functions of the gastric glands, also, become impaired. Long fasting and overwork will assist in weakening the powers of the stomach. The stomach may, also, become gorged from watering the horse soon after feeding. Wheat and other unsuitable articles of food are apt to produce impaction.

With respect to feeding and watering horses, see Chapter XX., page 491.

Symptoms.—Colicky pains. Pawing with the fore-feet, " especially the near one." (*Williams.*) Belching. Attempts at vomiting. Tremblings. Partial sweats. "Discharge of liquid matter from the nose." (*Robertson.*) Frequent pulse and quickened breathing. In other cases, as remarked by Professor Robertson, the chief symptoms are those of semi-unconsciousness. The animal leans his head against any convenient support; staggers, if forced to walk; and snores. The pulse is full and slow. This last condition is that which is popularly called "stomach staggers."

Treatment.—Treat as for colic. The horse should be well bedded down, lest rupture of the stomach might take place when rolling, during the paroxysms of pain. We may bleed, if the animal is more or less unconscious, and the pulse full and slow.

Rupture of the Stomach.

This fatal accident, which, usually, results from impaction, or from distension by gas, is especially liable to occur in animals that have been continuously fed on large quantities of boiled food, and whose stomachs have, consequently, become permanently weakened. (See remarks on "Impaction.") There are no specially characteristic symptoms; the usual ones being those of aggravated impaction, with sudden weakness and rapid sinking of the vital powers. In many instances, vomiting occurs, either before, or after rupture of the stomach takes place.

Mr. Fred. Smith states, that when a horse vomits, at this time, the rejected food, etc., as a rule, dribbles from the nostrils, and is but seldom discharged violently. He, also, remarks, that the action of bots; the practice of wind-sucking; and the effect of struggling on the ground (see page 317), when the animal is suffering from colic, sometimes cause this accident.

Grass Staggers

Is caused by the eating of over-ripe grass, especially rye-grass, at a time when a peculiar and poisonous narcotic principle is developed in it, as appears to happen in certain seasons. The disease is liable to affect a number of animals that are under the same grazing conditions.

The *symptoms*, generally, take two or three days to become developed. The animal gradually becomes more or less unconscious and paralyzed, and staggers if forced to walk. Although he may have great difficulty in keeping on his legs, he is extremely averse from going down, and leans for support against any convenient object. He breathes in a snoring manner. The mucous membranes are tinged with yellow. Convulsions, or spasms like those of tetanus, may come on.

Recovery may be expected in cases which are not marked by extreme symptoms.

Treatment.—Give a full dose of aloes, combined with a drachm of calomel. Bleeding may be tried. Back rake and administer a couple of enemas of warm water.

Superpurgation

Is the term applied to excessive diarrhœa brought on by the action of purgative medicine.

Causes.—Giving too strong a purgative; giving a second purgative before the first one has commenced to act; exercising the horse before or soon after the physic has "set" (physic is said to "set" when the purging ceases and the dung begins to assume its normal appearance); administering physic without preparing the animal for it; allowing him to drink a quantity of cold water shortly after giving physic; giving physic on an empty stomach and then keeping the horse without food; etc.

"We should be very careful in putting a horse to work soon after giving him a dose of aloes which has failed to move him; for the longer a purgative is retained in the body, the greater the danger from its superaction." (*Williams.*)

Symptoms.—Frequent purging. Loss of appetite. Debility. Weak pulse. The dangerous symptoms are: offensive breath; bad smell from the evacuations; glassy eyes; and distention of the belly with cessation of purging, caused by the bowel losing the power to perform its natural movements on becoming inflamed. Laminitis frequently results from superpurgation.

Treatment.—If the symptoms are not very urgent, the action of the physic should not be checked further than by keeping the animal warmly clothed, quiet, and allowing him only small quantities of thin gruel made from flour or rice, or boiled milk to drink, care being taken that the milk, if it be used, is not smoked in the slightest. On no account give linseed or roots, as they are laxatives.

If the horse gets worse, or if symptoms of colic appear, foment the belly with hot water, and give 3 oz. of laudanum, or an ounce of chlorodyne, in a quart of rice or starch water; or water boiled with a little flour to a like consistency will do. If this does not afford relief, repeat, after a couple of hours, the laudanum and rice water combined with 1½ oz. of sweet spirits of nitre; or the chlorodyne. The fluid in which the sweet spirits of nitre or chlorodyne is given, should be cold. If the horse be very weak, a bottle of port wine may be given. If neither opium nor laudanum be at hand, substitute for them camphor in 2-drachm doses. To support the strength, we may give boiled milk with eggs beaten up in it. In superpurgation, a few bruised oats and dry bran with some well-preserved hay may be given from time to time; as they are useful to stop the purging. Bran mashes should not be given, as bran in that form is a laxative.

If distension of the abdomen appears, give 2 oz. of turpentine in a pint of gruel.

During convalescence, the patient should be very carefully and gradually brought on to his ordinary food, and he should be kept quiet and free from excitement; as any unexpected or unusual noise or bustle may bring on a fit of purging.

Diarrhœa.

Many horses, more particularly slack-loined, slight, "washy" animals, purge if excited by exercise; or, if racehorses, by being brought on to a racecourse. Such animals are, often, liable to diarrhœa from trifling changes of food or of temperature. Diarrhœa may be simply an effort of nature to expel some irritating matter from the bowels or from the blood; in which case, it should on no account be prematurely checked. It may be due to worms, or to working the horse soon after he has drunk a large amount of water, subsequent to long abstinence from it.

In India, horses frequently get diarrhœa from being fed on an excess of gram, a grain almost identical in composition with peas, and which has a very "heating" effect on the system, owing to the large proportion of albumen it contains. A cure may be rapidly accomplished by giving a few bran mashes, followed by a considerably decreased supply of gram, which may be mixed with dry bran, bruised oats, or boiled barley and dry bran.

"Washy" horses which are inclined to scour, should, as a rule, be fed on bruised oats in preference to any other grain. A limited proportion of beans may be used with advantage.

3lbs. or 4lbs. of dry bran, divided between the four or five feeds which a horse gets daily, will have a binding effect; while linseed and bran mashes will aid in allaying irritation. Sir Frederick Fitzwygram remarks that "to horses predisposed to scour, water should be given frequently and in reduced quantities, and in winter the chill should be taken off by mixing it with a very little warm water. Perhaps the best plan is to leave water always before such horses, because when so supplied, they drink less than when watered at intervals. . . . If the reduction of the quantity of water does not produce the desired effect, it may be mixed with a little wheaten meal. . . . Horses disposed to scour should be stinted of food and water before going to work. Some will scour unless a little hay be given to them in the morning before they are watered."

These horses should always have hay in the stall at the same time as they are consuming their allowance of corn, in order to induce them to vary the corn with the more bulky food, so as to comply with the well-known law that the food of the horse must have a certain bulk in order to adequately fill his intestines, which are of large volume.

If the horse be a greedy feeder, he should have some hay before each feed.

The oats given should always be bruised; for, in that state, they will require to be more thoroughly masticated than when whole. Besides, the hard husk, which might have an irritating effect on the intestines, will become broken up.

The corn may be given from a trough or sheet placed on the ground, so that the animal may be obliged to take a considerable time over its consumption.

In cases where the diarrhœa is brought on by improper food, give a pint of linseed oil and attend carefully to the diet. Instead of plain water, give rice water, or thin flour gruel. Give bruised oats and dry bran. Keep the horse warmly clothed and comfortably stabled. If the horse's mouth has a sour smell, give 2 oz. of bicarbonate of soda (baking soda) in his food daily. If the case does not yield to these simple measures, give once or twice a day, after purging, an ounce of laudanum in a pint of rice water. If this fails, administer the following ball:—

Powdered opium	1 drachm.
Powdered catechu	2 drachms.
Prepared chalk	4 ,,

Treacle enough to make up into a ball.

A little port wine, spirits and warm water, or ounce doses of sweet spirits of nitre, may be given now and then, if the horse be very weak.

Professor Fearnley strongly advises the employment, in cases of simple diarrhœa, of Professor Dick's colic draught, which consists of—

Raw linseed oil	16 oz.
Oil of turpentine	2 ,,
Laudanum	1½ ,,

One should always be careful not to administer too much physic, nor to check the diarrhœa suddenly by medicines, when milder means might suffice.

The not very uncommon practice, among horse dealers and grooms, of giving arsenic to improve the appearance of the skin, tends to cause irritability of the coats of the intestines, and to render the animal liable to diarrhœa.

Young foals often get diarrhœa on account of being weaned too soon; being kept separated from their dams too long; or by reason of their dams being worked. A mild dose of linseed oil will generally be of service here. A little bicarbonate of soda may be given in the drink to check acidity; and rice water, boiled milk, with a small quantity of chlorodyne or chloric æther, may be used to stop the purging.

Chronic Indigestion (*Dyspepsia*).

The usual causes of this complaint are: improper food; an improper system of feeding and watering; imperfect chewing of the food by the animal, owing to bad teeth, or to the forage being given in such a form that he bolts it; constitutional tendency; and injudicious use of medicines. In young animals, according to Professor Williams, it is generally caused by draughts of cold milk; by removal from the dam at too early an age; by sucking at rare intervals, or when the dam is heated by work.

Symptoms.—The animal loses condition. His appetite is, generally, capricious and depraved. There is often acidity of the stomach, as is evinced by his grinding his teeth, and by his partiality for licking whitewashed walls. He may crib-bite, or wind-suck. The mouth has a sour smell. Cough often accompanies indigestion. The coat is out of order, being "hide-bound," dry, lacking its natural gloss, and being filled with dandruff. Frequently, the horn of the hoofs becomes shelly and brittle. These conditions are due to the sympathy which exists between the skin, the sensitive laminæ of the feet, and the mucous membrane which lines the alimentary canal. The dung, owing to the absence of a proper supply of bile, which is a powerful deodorizer, has a foul smell. It is composed of imperfectly digested materials, the hay and corn being passed in a more or less unaltered condition. Hence, the dung loses its natural healthy colour and appearance. "In the stable, the horse is mostly inclined to be costive ; but when taken to work or exercise is soon excited to purge." *(Percivall).* He is often subject to colicky pains, especially, soon after being fed. The abdomen is frequently distended with gas, owing to the digestive organs being unable to take up what they require of the nutritive part of the food, and to expel the remainder before it decomposes ; which it quickly does, when, through derangement of the liver, the supply of bile, the presence of which checks decomposition, is curtailed.

Treatment.—Beyond advising the reader to avoid the causes of indigestion, I have little to say regarding its cure, which is chiefly a question of diet and stable management.—A pint of linseed oil may be given as a drench once a week. Mix through the daily allowance of food, 2 oz. of the bicarbonate of soda, which is not alone an antacid, but is also a sedative to the mucous membrane, while it assists the liver in the removal of deleterious matter from the blood. Not more than seven or eight pounds of corn, of which half may be dry bran, should be given ; and the horse should have a liberal though judicious supply of carrots and green food. Much benefit is often obtained by allowing the animal, if he chooses, to eat earth, which may be supplied to him along with fresh-cut sods. He should have the free use of salt, say 2 oz. a day in his food, or he may have a lump of rock salt, to lick when he likes, in his manger. If there be debility, give vegetable tonics, such as ½ drachm of nux vomica mixed through the food twice a day, or a quart of ale with 2 drachms of gentian or chirretta twice a day. If the action of the liver be suspected to be at fault, give daily in a ball a drachm and a half of powered ipecacuanha for five or six days.

Medicine in this disease should be employed very sparingly. The horse should be warmly clothed, carefully exercised, and well groomed, in order to set up a healthy action of the skin; so that, by sympathy, the mucous membrance of the intestines may be beneficially influenced. In winter, clipping the coat has often a good result.

When everything else fails in restoring the horse to health, try the effect of a run at grass, not forgetting to allow him a supply of salt.

Constipation

Is a symptom of various diseases, and may be due to natural tendency, constitutional weakness, paralysis of the bowels, knotting or twisting of the intestines, the action of certain drugs, the presence of calculi (balls of earthy or undigested matter) in the intestines, obstruction of the bowel itself, errors of feeding, watering etc. Horses that have not a plentiful supply of water are very liable to impaction. We may, however, for convenience sake, limit the term to retention of dung (fæcal accumulation) owing to deficient action of the bowels; to the practice of feeding horses on food that contains an excess of indigestible matter; and to improper methods of feeding and watering.

Treatment.—Constipation, when it is caused by improper food, rarely kills, even though no dung may be passed for three weeks, or even longer, as has not unfrequently happened in cases which have, subsequently, made good recoveries. This fact should teach us to exercise patience when treating this condition.

Strong purgatives, such as aloes or croton, may, if given, cause rupture of the intestine and consequent death, by producing a copious watery discharge which may not be able to force a passage, in a natural manner by the removal of the impacted matter.

If colicky pains are present, with a hard pulse, a purgative should on no account be given; for such a condition indicates a tendency to inflammation. The administration of belladonna will here, be appropriate. If the pulse is soft, a gentle purgative may be given.

In constipation owing to errors of feeding, we should starve the animal, give a pint and a half of linseed oil, two or three times, back rake once or twice, and give two or three enemas of as much cold water as the bowel will take. If the belly be distended with gas, give 2 ozs. of turpentine with the oil. The animal may be carefully exercised, provided he is not troubled with flatulency. If these measures do not produce the desired effect, give two drachms of belladonna in a ball, or made up into a soft mass with treacle, and placed between the horse's back teeth, so that he may gradually swallow it. The amount of belladonna may be increased to 3 or 4 drachms in urgent cases accompanied by pain. The belladonna may be repeated in half its previous amount, after a few hours, if necessary.

The belladonna stimulates the vermicular motion of the bowels, without causing a watery discharge into them, and also allays pain. It is specially indicated, if the constipation is accompanied by colicky pains. The linseed oil is useful in softening and lubricating the undigested mass of food. The turpentine checks the evolution of gas, and also increases the action of the bowels. I need hardly say that full time should be given these drugs to act. Opium should on no account be employed; as it checks the action of the intestines. In human practice good results are often obtained by an enema of about a drachm of glycerine. Probably about two ounces would be a proportionate amount for a horse, Glycerine acts by virtue of its great affinity for water, in that it causes a rush of that fluid to the part of the bowel occupied by it.

No harm can be done by keeping the horse for ten days or a fortnight on nothing but water or linseed tea. Allowing him, on the contrary, an amount which would be moderate at other times, might fatally complicate matters during an attack of constipation. Many instances are on record of horses living over three weeks on nothing but water.

The absence of intestinal rumbling or murmurs, which may be heard in the healthy horse, on applying the ear to the side of the belly, is the characteristic symptom of paralysis of the bowels. "Another may be mentioned of not unfrequent occurrence, especially, if the paralysis be in the lower intestines, namely, a dilated, dry, and non-contractile condition of the rectum, which feels, when the hand is introduced, as a large cavity with passive walls." (*Williams.*) The condition of paralysis may be overcome by giving a drachm of nux vomica twice a day, as well as the linseed oil.

Intestinal Worms.

There are two kinds of worms commonly met with in the intestines of the horse:—1. Round worms (*ascaris megalocephala*), which are very like earth worms. They, generally, reside in the small intestine, although they are sometimes met with in the stomach; their presence in that organ usually causing great derangement. When these worms infest the horse in considerable numbers, he falls away in condition, and his general health is more or less affected, which fact may be evinced by a morbid state of the appetite, rough coat, pot belly, etc. On account of the irritation due to the presence of these parasites, mucus (slime) often comes away with the dung.

2. The second kind, or thread worms (*oxyuris curvala*), are threadlike parasites, about an inch and a half long, and are, generally, found in the rectum—the large straight intestine terminating at the anus—though sometimes higher up in the colon, or cæcum, which are portions of the large intestine. Their presence produces little disturbance of the animal's general health, although it may cause irritation about the dock, which is evinced by the horse rubbing his tail. Accompanying this irritation, a lightish yellow waxy substance—eggs of the parasite—will be found adhering to the skin immediately below the anus.

Tapeworms, and others which have not been already mentioned, are met with, though rarely, in the horse. The principles to be attended to for their removal, differ in no wise from those to be observed in treating the animal for the two more common kinds.

Worms are much oftener found in young than in aged horses.

In the removal of these parasites, two conditions must be attended to:—1. Their destruction or expulsion. 2. After their ejection, the employment of "means calculated to restore the digestive organs to a healthy state, and to correct that peculiar condition of them (*helminthiasis*) which promotes the generation of intestinal worms. The means best calculated for this purpose are—keeping the body warm by proper clothing, a light but nutritious diet with a moderate use of common salt, and at the same time the administration of bitter tonics with gentle aperients, and, if anæmia [deficiency and poverty of the blood] be present, the preparations of iron." (*Neligan's* "*Medicines.*")

The best treatment for round worms consists in giving 1½ drachms each of tartar emetic and sulphate of iron in the horse's food every day for a week, and then administering a purgative; keeping the animal in the meantime on bran and hay. Although this diet will weaken him for a short time; still it will also affect the parasites, and induce them the more readily to quit the intestines. Tartar emetic, the effect of which is but slightly depressing to the horse, even when given in very large doses, appears to have a most nauseating influence on the parasites, which readily come away when subjected to its influence. The sulphate of iron, probably on account of its astringent properties, clears the intestines of an excess of mucus, which forms, according to Professor Fearnley, a nest for the worms. In bad cases, a second course of tartar emetic and sulphate of iron, followed by a physic ball may be tried after an interval of a week. After this, the animal may get, in his food, a drachm of sulphate of iron every day for a fortnight or three weeks.

For threadworms, give an enema of warm water to clear out the rectum, and, then, another enema of six or eight ounces of oil of turpentine in a quart of linseed oil.

Turpentine, which is a most valuable worm-killer, should, with this object, be given in full doses, for in small ones it simply causes the kidneys to act; and should be repeated only at long intervals. Owing to its irritating effect on the mucous membrane, it should be given in oil, which is also a worm-destroyer, in that it clogs up the skin through which the worms breathe. The usual dose is three to four ounces in a pint and a half of linseed oil. Turpentine causes death to the parasite on contact, which readily takes place owing to its being volatile.

Anointing the inside of the anus with a little mercurial ointment on the finger, will hasten the removal of the worms and allay the itching.

The free use of common, or rock salt, is, perhaps, the best preventative against an attack of worms in the horse; its action, in this respect, being due to the beneficial effect it exerts on the animal's general health and to its antiseptic properties.

Bots.

During the autumn months, the gadfly seeks to lay its eggs on the front of the fore-legs, chest, and sides of horses it meets in the fields. It appears to instinctively choose those positions which are in reach of the animal's tongue. The presence of these small yellow eggs causes itching of the skin, so that the animal is induced to lick with his tongue the parts to which they adhere. The eggs, on being hatched, produce small maggots, which are, in this way, conveyed into the stomach, to which they attach themselves by means of hooks that enable them to maintain their position until they arrive, after about eight months, at a state approaching maturity. The larva then loses its hold on the mucous coat of the stomach, and is expelled with the dung. It becomes, subsequently, converted into a gadfly.

If the eggs are seen on the animal's skin, they may be removed by picking them off, or sponging them over with paraffin oil.

No *treatment* is necessary, as the presence of bots in the stomach seems to have little hurtful effect on the horse, and medicines do not appear to have much power in dislodging the larvæ, which readily pass out at their appointed time. I am not at all certain that a course of tartar emetic, say, two drachms a day in the food for a fortnight, would not have a marked influence in expelling these parasites. If they irritate the horse when coming away, he may get, as a drench, 1½ pints of linseed oil and 4 oz. of turpentine, and the inside of the anus may be smeared round with a little mercurial ointment.

Crib-biting and Wind-sucking.

As these stable vices are connected with derangement of the organs of digestion, I have classed them under the present section.

The crib-biter is one that has acquired the habit of seizing with his teeth the manger, or other convenient object, and, while holding it, he endeavours to belch out air from his stomach. In some confirmed cases, when the cribber is prevented from using his teeth by having a muzzle on, he will manage to crib, if he can rest his chin against some point of support.

"A wind-sucker smacks his lips, gathers air into his mouth, extends his head, or presses it against some solid body, arches his neck, gathers his feet together, and undoubtedly swallows air, blowing himself out, sometimes to a tremendous extent." (*Williams.*) He does not catch hold of any point of support like the crib-biter.

The crib-biter, from practising his favourite vice, generally wears away in time the edges of his centre and lateral front teeth. I have alluded, in *Soundness and Age of Horses* (*q. v.*), to the various ways in which the teeth become worn through the practice of this vice.

These habits seem, in some cases, to have been acquired as simple vices; their practice causing impairment of the digestion, and, consequently, that of the general health and condition. In other instances, they—especially wind-sucking—appear to be brought on by derangement of the digestive organs.

Wind-sucking is a much rarer disease, and is far more hurtful to the health than cribbing. It sometimes gives rise to flatulency. As these vices are readily acquired by imitation, horses which have them should be kept apart from other animals.

Causes.—Idleness; indigestion; imitation; and irritation from teething.

Treatment.—Attend to the animal's general health, as directed under "Indigestion" (page 328). The crib-biter may be fed from a sheet placed on the ground, and all objects which he can grasp with his teeth should be removed from the stall; or they may be covered with some substance which he will not bite, such as that used for making iron wire mill sieves, or rope made of coarse fibre. An admirable material, to be used for this purpose in India, is (as recommended to me by Mr. J. Anderson, late I.V.S. Bombay Army) *moonj* rope covered with cow-dung. Or we may use, during the intervals between feeding-hours, a bar muzzle, which, while checking the vice, will allow the horse to eat his hay.

The crib-biter may be picketed in his stall by one fore-leg in front, and by the opposite hind-leg behind, instead of being tethered in the usual manner, by a rope or chain to his headstall.

To prevent wind-sucking and crib-biting, a strap may be kept buckled round the neck, sufficiently loose to admit of food and water being readily swallowed; but tight enough to prevent the contraction of the muscles which arch the neck. For the same purpose, a strap with sharp spikes may be used. These appliances may be procured from any saddler.

Leaving a constant supply of water for the crib-biter or wind-sucker, in his stall, will sometimes effect a cure. Such horses should have a lump of rock salt (weighing, say, 2 lbs.) placed in their stalls to lick, as well as a constant supply of water.

Lampas

Is a swollen condition of the palate, which, then, projects below the level of the front teeth. It is usually met with in the young animal, as a consequence of the large supply of blood which is required for the growth of his teeth. It may be caused by cold, indigestion, etc. As lampas, except when it occurs from teething, is merely a symptom of derangement, the part should not, as a rule, be interfered with in any way ; a couple of bran mashes, with half an ounce of nitre in them, or a mild dose of physic, being all that is, generally, necessary. If the horse " quids " his food, from congestion during teething, and it is not convenient to throw him by for a few days, the palate may be lightly scored with a lancet or penknife, care being taken not to wound the artery which lies underneath, and then rubbed with common salt. Bathing the part with a strong solution of alum and water may be sufficient, without lancing it.

Choking.

This term applies to obstruction of the gullet as well as to that of the windpipe.

Choking is usually caused by the horse ravenously swallowing a quantity of dry food, which becomes impacted in his gullet; or by pieces of carrots or other roots, eggs (given by the groom with the idea of improving the condition), or hard physic balls, sticking in the gullet. It is not uncommon for draught horses to become choked on being started off when they have food in their mouths. In this case, the windpipe becomes pressed between the collar and the bolus of food in the gullet. Sometimes, the horse becomes choked in draught, simply on account of too small a collar compressing the windpipe. The same thing may happen when casting an animal with ropes. The necessary precautions are too obvious for detail.

Although obstruction of the windpipe will kill in three or four minutes, that of the gullet may not prove fatal for several days. I saw an instance of choking that became spontaneously relieved after ninety-six hours of complete obstruction, during which time any food or drink taken was returned through the nostrils. The destructive changes set up by the presence of the ball for so long a period in the gullet, caused the death of the animal in about three months' time.

I may mention that the gullet is a membranous and easily dilatable tube, the office of which is to convey food into the stomach. It commences at the back of the mouth, proceeds immediately above the windpipe for about half way down the neck, and then takes its place on the left of the windpipe till it enters the chest. Hence, we should stand on the left of the animal when we want to see if anything goes down the gullet. This tube becomes a little narrowed near its entrance into the stomach.

Symptoms of Obstruction of the Gullet.—Very anxious expression of face and great distress. Nose generally poked out, and neck more or less stiff. Flow of saliva from the mouth. Inability, more or less complete, to swallow. Fluids returned through the nostrils, and sometimes through the mouth. If grass be chewed, the discharge from the nostrils, will, during that time, be green coloured. Attempts at vomiting. Continued distension of the gullet will be an unerring sign of obstruction, and, when present, will be seen, chiefly, on the left side.

Treatment.—No time should be lost in attempting to remove the obstruction; for the continued presence of the foreign body may give rise to serious complications, such as sloughing of the mucous membrane at the seat of impaction, and inflammation of the lungs from the entrance of fluid and other matters into the windpipe. If the offending substance be within reach, it may be removed by the hand; while an assistant may aid by pressing it forward with his fingers. If it be too far down for this, it may be "started" by gently manipulating the gullet. If an egg sticks fast it may be readily broken by pressure, if a stout needle is first of all run through it. If the obstruction is due to dry food, we should give repeated drenches of oil, and water, and allow the animal full liberty to return the fluid, which will assist in removing the impacted mass. We should let the patient have a constant supply of linseed tea or water to sip, and return through his nostrils if he likes. If the horse is quiet, we may twitch him, and then pass a probang through his mouth into his gullet, so as to overcome the stoppage; great care being taken not to shove the probang into the windpipe. In default of a regular probang, we may use a male catheter, a flexible lunging whip with a soft round head on its point, or even a piece of rope "served" round with twine to make it stiff and smooth. If the animal be difficult to handle, it may be "cast" and put under the influence of chloroform, the administration of which and the passing of a probang are operations that demand some skill in the operator. If the cause of the obstruction can be felt from the outside, and if it resists all other efforts for its dislodgement, it may be cut down upon and removed, and the wound closed by a couple of stitches, after having been treated antiseptically (see page 169). Wounds in the gullet should be avoided if possible; for they do not as a rule heal well. The animal should be kept without food as long as practicable, until the wound has healed. After relieving a case of choking, the animal should be kept on sloppy food, so as to allow the irritated mucous membrane of the gullet to regain its healthy condition.

Prolapsus of the Rectum.

In mild cases, this accident consists of the protrusion from the anus of mucous membrane, which, on becoming inflamed and infiltrated, may present a rounded mass of about a foot broad, with a depression in its centre. In some cases, the bowel itself may come down.

It may come on from straining due to colic, constipation, foaling, or sexual excitement, or from paralysis.

Treatment.—Remove any impacted dung, and endeavour, by steady pressure, to replace the part after anointing it freely with oil. If this does not succeed, scarify the mucous membrane freely with the lancet, and encourage the bleeding by the application of warm water, and, when the swelling has gone down, again attempt to replace the part. Keep the animal for some days on soft food, in which a pint of linseed oil may be given daily with advantage.

Calculi and Concretions in the Bowels.

In the bowels of the horse, especially, in the large intestine, are, sometimes, found balls of undigested material, which, not unfrequently, attain a diameter of five or six inches, or even more; and, as they become larger and larger, eventually cause death, as a rule, from obstruction and pain. They are of three varieties. (1) Phosphatic calculi, which look like rounded and polished stones, and are chiefly composed of phosphates of magnesia and lime. (2) Oat-hair calculi, or dust-balls, which are formed of closely packed, undigested, vegetable matter. (3) Mixed calculi, which are made up of earthy and vegetable constituents. I may remark that the term "calculus" should, strictly speaking, be restricted to the first variety; and that the other two may be called "concretions."

The earthy material of phosphatic calculi appears to be derived from the food which the animal, owing to some deficiency in its digestive powers, has been unable to assimilate or to pass out. Forage which contains a quantity of the hairs and husks of oats or meal dust, is apt to give rise to intestinal concretions, which are hardly ever found among animals that are carefully looked after. As these balls are, as a rule, built up, in the first instance, round some hard and indigestible object, such as a piece of metal, or fragment of stone, which acts as a nucleus, we should be careful to have the food which we intend to give our horses, thoroughly clean.

These balls may attain a large size without causing the death of the animal, or, even, without giving rise to any marked symptoms of ill-health; in which case, they continue to remain in some portion of the intestine, where, owing to the large diameter of the gut, they may not cause obstruction to the passage of food, until they become greatly increased in bulk. If, however, they happen to become dislodged by some cause, as, for instance, by the action of a purgative, they may, very possibly, set up fatal obstruction by becoming wedged in some narrower portion of the large intestine, which, I may remark, varies greatly in size along its course. Usually the presence of calculi, in the bowels of the horse, occasions, from time to time, attacks of colic and constipation, in which case, the absence of other causes may lead us to infer the existence of the disease in question. Professor Dick remarked that "in an advanced stage, no doubt can remain as to the nature of the disorder. The countenance is haggard, the eye distressed, the back up, the belly distended, the respiration becomes hurried, bowels habitually costive; the horse, when he is attacked with pain from this cause, will sit like a dog upon his haunches." This position, however, is also assumed by the horse in other affections, so cannot be regarded as a distinguishing symptom.

Professor Williams recommends that, as these balls are, sometimes, lodged in the rectum, an examination of that part should be made in all cases of abdominal pain. He is opposed to the practice recommended by Professor Dick, of giving strong purgatives and large enemas, with a view to clearing away the obstruction.

CHAPTER XIII.

Diseases of the Urinary Organs.

RETENTION OF URINE—BLOODY URINE—DIABETES OR PROFUSE STALING—INFLAMMATION OF THE BLADDER AND STRANGURY—ALBUMINOUS URINE—STONE IN THE BLADDER.

Retention of Urine.

This affection is generally caused by spasm of the neck of the bladder; by paralysis of the bladder; by the accumulation of hardened soapy matter in the sheath, owing to neglect of cleanliness; by the horse having been kept too long from staling, and by chill. It may also be due to the presence of stone in the bladder or urethra (the canal by which the urine escapes), and to other causes affecting these parts. It may accompany colic and other diseases. Although in colic there may be retention; still, when suffering from it, the animal does not make such frequent attempts to stale, as he does when attacked by the ailment under consideration.

"The symptoms are frequent and ineffectual attempts to urinate; if standing, the animal will stretch itself out, strain violently, and groan with pain, discharging but a few drops of urine, or none at all. Examination *per rectum* will enable the practitioner to feel the distended bladder with the hand, and this distension of the bladder is the diagnostic symptom." (*Williams.*)

Treatment.—Foment the loins; give an enema of warm water in which half an ounce of opium has been boiled; clothe warmly; give a pint of linseed oil, and after that the following ball.

Opium	1½ drachms.
Camphor	2½ ,,

Repeat the ball, if, after an hour or two, the horse has not staled. If the symptoms are urgent; or if the foregoing measures do not succeed, pass a catheter. When the animal has staled, give linseed mashes and linseed tea.

Bloody Urine.

The dark or bloody colour assumed by the urine is, usually, caused by improper feeding, or by strains received during violent exertion. I knew a steeplechase horse that was always more or less affected in this manner after a race. Disease of the kidneys, irritation of the urinary passages, and the presence of calculi, are also causes of bloody urine.

Treatment.—Put the horse on cooling food. Give linseed mashes, and substitute linseed tea for water as his drink. Give a mild dose of physic and two drachms of tincture of steel in water twice a day for a fortnight. In India, a decoction of the leaves of the *sissoo* or *seesum* tree is a favourite native remedy. About half a bucketful of the leaves is taken, water is poured over them, they are mashed up between the hands, and are allowed to soak in the water for nine or ten hours: the fluid should be then strained off and given to the horse to drink. The mixture of a couple of handfuls of unrefined sugar (termed *goor* in Hindustanee) will make this drink palatable to him. This mucilaginous fluid acts as an emollient in soothing irritation.

The *rationale* of the foregoing treatment is as follows :—The purgative is given to draw the blood away from the inflamed urinary passages. The tincture of the terchloride of iron acts as an astringent in causing contraction of the congested blood vessels of the affected part, and thereby checks the flow of blood, while the linseed and sissoo are simply soothing agents.

If the urine be very dark-coloured without the presence of blood, we may generally conclude that this condition is due to too high feeding. The treatment should be a full dose of physic (aloes) ; cooling diet of very limited amount ; and ¾ oz. of nitre daily in the food or water. As the injurious substances which accumulate in the blood from too high feeding, are gradually got rid of along with the urine, we give nitre in order to stimulate the kidneys to remove them as quickly as possible out of the system.

Diabetes, or Profuse Staling.

See page 408.

Inflammation of the Bladder and Strangury.

We may say that the only cause of this disease is the absorption into the system—by internal administration or external application—of cantharides or croton. Fatal consequences have, sometimes, occurred from blistering "all round." In warm weather, the urinary organs are more liable to become affected by blisters than when the temperature of the air is low. The chief reason for this is, I think, that in summer, owing to the increased action of the skin, less urine is secreted, and, consequently, the irritating matter, being less diluted, cannot be removed from the bladder as quickly as when the amount of urine is abundant, as in cold weather. Besides this, when the temperature of the air is high, the absorbents take up the active principle of the blister more rapidly.

Mares, at certain seasons, owing to sexual causes, are very liable to this affection from blisters.

Symptoms.—The lining membrane of the mouth—as indeed that of the whole intestinal canal—becomes red and inflamed. In the horse and mare there is sexual excitement. "The urine is voided frequently, and with difficulty and pain, as it is irritating and burning; it is highly albuminous; the fæces are covered with mucus and mixed with blood." (*Gamgee.*)

There is fever, pain, and excitement. The urine contains mucus, with or without blood. If the symptoms be not alleviated, the disease will run a fatal course in two or three days.

Treatment.—If the disease results from a blister, wash the blistered part with warm water, having some carbonate of potash dissolved in it. Give the horse linseed tea to drink, and put him on bran mashes. If he will eat, mix two ounces of the bicarbonate of soda in the food daily, or divide them between two or three drenches. Give the whites of a couple of dozen raw eggs, now and then. Administer in a ball, three drachms of camphor twice a day. If there be great pain, give once or twice in the day, 2 drachms of the extract of belladonna in a ball, or, having previously made it into a soft mass with treacle and linseed meal, place it between the back teeth to gradually dissolve.

Principles of Treatment.—Both the bicarbonate of soda and the linseed tea have a soothing effect on the mucous membrane, and the sedative influence of camphor is well marked in cases of irritation of the urinary organs. The belladonna acts as a sedative to the urinary organs by causing contraction of the blood vessels of the part, and, thereby, tends to reduce the inflammation. It is a powerful sedative. The carbonate of potash forms a soap with the oily matter of any portion of the blister that may have remained on the spot, and thus aids in removing it. The white of egg is given as a demulcent.

Albuminous Urine.

The existence of albumen in the urine arises, generally, from causes unconnected with actual disorder of the urinary organs, the removal of the cause being, then, the only treatment required. Albumen is often found in the urine after hard work; and also during fatty degeneration of the kidneys—a very rare complaint among horses—the symptoms of which are: stiffness in movement; and the continued practice by the horse of standing stretched out in his stall, as if he were about to stale. In this disease, treatment appears to be of no avail.

To test for albumen in the urine, put a small quantity of the fluid into a test tube, add a few drops of acetic acid, or vinegar, to neutralize it (as albumen is soluble by an alkali), and boil the fluid over a lamp. If albumen be present, a coagulum will be formed, which will remain unchanged on the addition of nitric acid, but will be dissolved by liquor ammoniæ. If there be but little albumen present, the precipitate will not appear until the urine boils; if much, it will show itself before boiling point be reached. Another method is to "charge a test-tube to a depth of ½ or ¾ inch with strong nitric acid, and then pour a small quantity of urine slowly down the side of the inclined plane, so that it may rest on the acid without mixing with it. If albumen be present, an opaque white cloud, disc-like in form, immediately appears in the plane of contact of the two fluids." (*Bristowe.*)

Stone in the Bladder.

The horse, like man, may be affected with calculi (stone) in the kidneys, ureters, bladder, or urethra. These calculi are largely composed of carbonate of lime, which is always to be found in the urine; hence, the presence of stone in the positions just mentioned, and the danger of keeping horses from staling for prolonged periods. I may remark, in passing, that when a horse is in his stall, with the bedding "up," he should always have some straw under him, on which to stale; and that when a horse is kept for a long time at work, as when hunting, or on a journey, he should be given full opportunities to do so, and, especially, on grass, so that he may not splash his legs, the fear of doing which might cause him to refrain from micturating longer than he ought to do. These calculi may vary in bulk from fine sand to a mass the size of a man's fist, or even larger; and may be of a hard nature, or of the consistence of mortar, which, if remedial means be not used, may almost entirely fill the bladder. The *symptoms* are severe colicky pains, which recur more or less frequently; straining and repeated efforts to stale; inability to retain urine; interruption to the flow of urine; presence of blood in the urine; stiffness of gait of the hind limbs; "repeated motions of the tail." (*Williams.*) The presence of stone may be determined by an examination *per rectum.* Removal by operation need not be described here.

CHAPTER XIV.

Fevers and Constitutional Diseases.

ON THE NATURE OF FEVER—SIMPLE FEVER—STABLE FEVER—MALARIOUS FEVER—RELAPSING FEVER (BURMESE MULE DISEASE AND SURRA)—INFLUENZA OR PINK-EYE—EPIZOOTIC PLEURO-PNEUMONIA—STRANGLES—ANTHRAX OR LOODIANA FEVER—CAPE HORSE SICKNESS—CEREBRO-SPINAL FEVER—GLANDERS AND FARCY—HORSE SYPHILIS—HORSE-POX—DIABETES OR PROFUSE STALING—PURPURA—SCARLATINA—AZOTURIA—WEED OR LYMPHANGITIS—RHEUMATISM—MELANOSIS—RABIES.

We may broadly state that fevers are caused by the entrance, from without, into the system, of some disease-producing material; while, in constitutional diseases, the virus, whatever it may be, appears to be generated in the body itself. As it is impossible, with our present state of knowledge, to draw a hard and fast line between the two, I have grouped the various diseases under one heading.

On the Nature of Fever.

The term "fever" is used to express a state of the system in which the internal temperature of the body is higher than normal, and continues so for a certain time. This condition is accompanied by more or less general derangement, and by increased waste of tissue. The expression "specific fever" is employed to denote a febrile disease of more or less unvarying type, as smallpox or strangles. The bodily temperature of the horse is about 100·5° F., with a variation, consistent with health, of, perhaps, not more than 1·5 either way. Although the temperature of exposed parts, such as the limbs, ears and surface of the body, may vary considerably, without detriment, from the standard just mentioned; the degree of heat of the interior remains nearly constant, notwithstanding the vicissitudes of climate or the amount of exertion taken. Let us now glance at the causes which operate in maintaining this equable degree of heat.

On the one hand, we have sources of heat; on the other, cooling influences; while there is, also, a regulating apparatus for preserving the balance between the two. The heat is derived from the chemical changes that are constantly going on in the body. When air is breathed into the lungs, the blood which is in the small vessels of that organ (see page 267), absorbs oxygen and carries it to the various tissues, where it unites with waste products and, thus, keeps up a process of slow combustion, which supplies the required heat. The warm condition of a decomposing dunghill is a familiar instance of heat being produced by chemical action. Exercise raises the bodily heat by increasing the changes undergone in the tissues, and, also, by quickening the breathing; in that, more oxygen is taken into the blood. The surplus heat is got rid of by evaporation from the skin, lungs and mucous membrane; by radiation; and by matters taken into and expelled from the body; the balance between these two antagonistic processes of warming and cooling being preserved by the nerves. Thus, if we heat our body by exercise, or by, for instance, taking a bowl of warm soup, the nerves cause the blood-vessels of the surface to dilate, and, consequently, to become filled with blood; the result being that the sweat glands are stimulated, evaporation takes place from the skin, and the extra heat is carried off. The ordinary effect of a cold atmosphere, or of drinking icy water, is to prevent evaporation from the skin by causing, through the medium of the nerves, the superficial blood-vessels to contract. The action of the nerves appears, here, to be principally occupied in keeping down excess of bodily heat; for we find that, as a rule, nervous derangement is followed by a rise of temperature. Thus, the liability of horses to fever from exposure to the sun in tropical climates is greatly lessened by the practice of protecting their spines with a folded blanket; the spinal cord being a great nervous centre.

The chief cause, however, of fever appears to be the presence in the blood of material which enters from without, and, acting as a ferment, gives rise to an increased amount of chemical change in that fluid, with a corresponding rise of temperature. I may remark that these fever-producers or ferments are microscopic fungi which belong to a very low form of vegetable life, and are classed under the general term *bacteria*. These bodies, which vary in length from about $\frac{1}{500}$th to $\frac{1}{30000}$th of an inch, are found on the surface, and even in the interior of every living thing, and swarm in the air and water. They occur in endless variety, each being distinct from the others and having its own special duty. Thus, one kind is engaged in bringing about the putrefactive changes which are set up in the animal or vegetable body when it dies; another originates fermentation in milk; another, in wine; and so on; while there are special bacteria through whose agency alone, fevers can occur. Although it is most unlikely that bacteria can be spontaneously developed in the blood, still it is probable that some of them are always to be found in that fluid; the vital powers, as long as the health remains unimpaired, being ordinarily sufficient to prevent their development. Thus, we find, that anything which weakens the strength, such as injury or over-exertion, will, when influenza is rife, greatly predispose an animal to an attack of this disease. Young horses that are taken up from grass and are stabled for the first time in large towns, are prone to suffer from fever, especially, when the sanitary surroundings are imperfect. Some stables seem to be hot-beds for this complaint; a fact which is not difficult of comprehension, if we consider that the conditions of moist heat and the presence of putrefying matters are the very ones that are most favourable to the development of vegetable germs, some forms of which we may assume to be the fever-producers. A previous attack of certain specific fevers, such as anthrax and strangles, confers, to a great extent, immunity from subsequent ones of the same kind. The majority of fevers run their course in a more or less definite period of time, and are characterised by some peculiar manifestation, such as the abscesses of strangles, the pustules of horse-pox, and the catarrh of ordinary influenza; the virus appearing to be expelled along with these discharges or eruptions.

The causes of the high temperature of fever appears to be: excessive tissue change, as, for instance, from the presence of a ferment in the blood; and derangement of the nerves which regulate the internal temperature.

During the existence of fever, while the internal temperature is high, the ears and legs (below the knees and hocks) may feel cold to the touch; or one, or two of the limbs may be colder than the others. The animal may, also, have cold shivering fits (*rigors*); although the surrounding atmosphere may be warm. These conditions show, that, in these cases, heat is unequally distributed throughout the body. "Rigors appear to be explicable by the fact that owing to excessive contraction of its arteries, the skin receives less than its due share of blood, and less than its due proportion of heat generated within the body." (*Bristowe.*) The same remarks apply to coldness of the extremities without obvious cause.

General Treatment of Fever.—The objects which we should have, here, in view are: (1) To check the action of any disease ferments that may be in the body, by giving antiseptics, such as quinine, arsenic, salicylic acid, nitre, and salt; (2) to stimulate the skin and other excretory organs, so as to get rid of the waste products of tissue change, the retention of which would tend to poison the system; (3) to allay distressing symptoms; (4) to keep up the strength.

The Action of Antiseptics in Fever cases appears to be as follows: On being absorbed into the blood, they check the development of disease germs in that fluid, in the same manner as they would do that of ordinary blue mould in a liquid in which they were dissolved. It is probable that blood, in the living body, will resist the action of ferments much better than an ordinary fluid of similar chemical composition would do, and that, consequently, a comparatively small quantity of an antiseptic will be sufficient to check fermentation.

mple ever.

Simple fever is a condition of the body in which the internal temperature is higher than natural, and which appears to be produced by some functional derangement and not by the fully developed action of any special virus. It, usually, runs its course in a week or less.

The *symptoms* are: increased internal temperature; frequent pulse; quickened breathing; dulness; and loss of appetite.

The *causes* are: exposure to heat; exhaustion from violent and prolonged exertion; nervous shock; the influence of unhealthy surroundings. "Abortive or incomplete forms of some one or other of the specific continued fevers." (*Andrew.*)

Although simple fever is rare in England, it frequently occurs in India, and other tropical countries, the usual causes being exposure to the sun and imperfect ventilation of the stable during hot weather, especially, when the animals are highly fed and but little worked. Well-bred horses, and those of dark colour, resist the effects of the sun far better than those of a coarse breed or of a grey or white coat.

Treatment.—If possible, remove the animal to some healthy situation, if the sanitary conditions of his present abode are defective. Nurse him carefully; allow him soft food to eat, and an unlimited amount of cold water to drink. Give him the following draught three times a day for two or three days:—

Nitre	3 drachms.
Sweet spirits of nitre .	1 oz.
Cold water	1 pint.

If the sweet spirits of nitre be not at hand, give daily, $\frac{3}{4}$ oz. of nitre dissolved in the drinking water. If constipation be present, back rake, administer an enema, and give $\frac{1}{2}$ lb. of Epsom salts in water as a drench.

If the skin feels dry and hot, sponge it over with vinegar and water from time to time. If there be great heat about the forehead and temples, cover them over with wet cloths.

In hot countries, care should be taken that a free current of air is maintained through the stall, and that the animal is well protected, by a thick roof overhead, from the direct rays of the sun. In India, if the weather be very sultry, a couple of men may be employed to keep the horse cool by means of large hand fans.

When the severity of the attack has subsided, the horse should be fed liberally; green meat, if possible, being freely supplied. If he shows much debility, he may have a couple of quarts of beer a day, or other suitable vegetable tonic. As these fever cases, in hot countries, are often complicated by derangement of the liver, no salt of iron should, as a rule, be employed in their treatment.

Stable Fever.

For convenience sake, I place under this heading the form of fever to which young horses are liable when taken up from grass, or freshly introduced into stables, in which the virus of this form of fever appears to have a permanent abode. I have alluded on page 354 to this ailment, which I am strongly of opinion is due to the entrance, into the system, of disease germs, that find a rich and suitable soil in many of the dirty, crowded, and ill-ventilated stables which are to be met with in large towns. This view is strengthened by the fact that one or more previous attacks confer, to a certain extent, immunity from it. The better the sanitary conditions, the freer, as a rule, are stables from this complaint, which seems to remain fixed in certain buildings.

Malarious Fever.

In certain malarious parts of India, such as Lower and Eastern Bengal, horses, not uncommonly, become affected, at certain seasons of the year, with a low type of fever, in which there is extreme debility, with loss of appetite and condition. The pulse is feeble and oppressed; though, usually, without any very marked acceleration. I have not observed any other signs of ill-health, except a rise in the internal temperature.

There does not appear to be periods of accession and remission as in the intermittent fever of man. Cases of this fever not unfrequently terminate fatally.

In treating the disease, we should use a moderate purgative in order to clear the way for the action of the febrifuge, which should be some antiseptic, as quinine, cinchonine, carbolic acid or arsenic. Sulphate of quinine, though the most expensive, is undoubtedly the most useful agent. The antiseptic, whichever one is employed, should be given in large doses at first, and then gradually decreased; for, if the opposite to this be done, we may acclimatise (if I may use the word) the germs, whose presence in the blood is the cause of the disease, and thus render the drug comparatively powerless to affect them. Men in India who commence taking quinine in small doses for intermittent fever, frequently find that, after a time, it loses all power to check the disease.

Treatment.—Administer an enema, and give 8 oz. of Epsom salts in a pint of water as a drench. After about twelve hours, give ¼ oz. of quinine in a pint of water twice a day for the first couple of days, and then gradually diminish it down to 1 drachm, by the end of a week, when it may be discontinued. Or we may give 1½ drachms of carbolic acid in ½ pint of linseed oil twice a day for three days. If linseed oil be used, Epsom salts may be dispensed with. Give 1 oz. of sweet spirits of nitre, in a pint of cold water, two or three times a day, as a drench, as well as the quinine or carbolic acid. The sweet spirits of nitre is a good stimulant, and tends to promote the removal of impurities from the blood by acting on the kidneys and skin. It may be given along with the quinine. Allow laxative food; obtain for the animal, if practicable, a change of air, and nurse him carefully. During the period of convalescence, the patient should be liberally fed, and may have an ounce of liquor arsenicalis mixed in his food daily for a week; and, also, a quart of beer two or three times a day.

Relapsing Fever (*Burmese Mule Disease and Surra*).

I have compiled the following notes on this disease from a *Report by Vet. Surg. J. H. Steel, A.V.D., on Relapsing Fever among mules in Burma*, and from a *Report on Surra Disease*, by Dr. Griffith Evans, A.V.D.

Nature of the Disease.—Relapsing fever is caused by the presence, in the blood, of minute fermentative germs, which bear successive crops in that fluid. At one time, these parasites may be seen, by aid of the microscope, in vast numbers, traversing with great activity, every drop of blood examined; while their presence, owing to chemical changes induced—as witness the heat evolved during other forms of fermentation—causes a marked rise in the internal temperature of the body: in other words, fever. Besides the rapid waste of tissue and consequent exhaustion, due to this high temperature, these parasites attack and destroy the red corpuscles of the blood, and, thus, directly interfere with the nutrition of the body. When the acute stage has passed, these roving germs disappear, although they leave their seeds behind them; the temperature falls; and there is an interval of apparent health. If the remedies used, or the constitutional strength of the patient be sufficiently strong to prevent the development of this baneful harvest, the animal would, under ordinary circumstances, recover. The disease germs of equine relapsing fever are, however, so tenacious of life, that they have, up to the present, resisted all treatment; so that the sufferer, after passing through a more or less prolonged course of crises and intermissions (Mr. Steel has observed as many as seventeen), finally, dies of exhaustion, and of the diseased changes in his system, to which the malady has given rise.

Comparison between Relapsing Fever of Man, and that of the Horse and Mule.—In the former, the relapses (attacks of fever) are separated by an interval of about seven days; in the latter, by one of ten days. In man there is a small mortality; less than five per cent. In the horse and mule, the disease is always fatal. In the former, "there seems to be a close relation between starvation and relapsing fever" (*Bristowe*); in the latter, no such connection appears to exist. The human form of relapsing fever is highly contagious; but the equine one does not seem to possess this property. The germs of both resemble each other closely. Ulceration of the stomach, which is frequently present in Burmese mule disease, is not a characteristic of the relapsing fever of man.

Varieties.—Both Mr. Steel and Mr. Evans consider that Burmese mule disease and Surra are essentially the same; although they present a few divergencies of type, which may be accounted for, by differences in climate, food, etc.

Geographical Distribution.—Surra is well-known in the Dera Ismail Khan district, and in other parts of the trans-Indus portion of India. There have been outbreaks of surra in Bombay and in other places in India. It, probably, extends to Persia, and there is some reason to believe that it is met with in Egypt. Mule disease is well-known throughout Burma. Relapsing fever has been observed among the French artillery mules at Tonquin, and its identity proved by the presence of the special germ (motile spirillum).

Diseases for which Equine Relapsing Fever might be Mistaken.—It has, often, been confounded with *Kumree*; although the weakness from the general exhaustion of the one, is entirely different from that due to the local paralysis of the other. The chronic course of relapsing fever, and the manner in which the internal temperature varies, serve to distinguish it from anthrax, which runs a very brief course, during which, the temperature remains persistently high. The ulcerated condition of the stomach, as may be frequently seen by examination, after death, of cases of the Burmese disease, might give rise to the idea that death had been caused by poison.

Manner and Time of Invasion.—We have every reason to believe, that the disease germs of this malady are able to maintain their existence and virulent properties, outside of the animal body ; for the disease can be communicated by swallowing blood which has been drawn from a diseased animal, and in which these germs exist. It appears, however, to be neither contagious, nor infectious ; and, consequently, does not seem capable of being transmitted, under ordinary circumstances, from one animal to another. We cannot, at present, say how these parasites gain entrance into the system; whether by water, forage, or air.

Although cases of this disease may be met with, at all times of the year ; still the rainy season is the period during which they are most frequently observed : a fact which is in harmony with the stimulating influence of moist heat on low forms of life—such as disease germs—and with its enervating effect on the higher animals, especially, as regards their disease-resisting power.

Predisposing Causes.—Exposure to the weather, and the want of a free current of air through the stable, seem to predispose animals to this complaint. The use of unbroken and unhusked rice, and of rice straw, may, also, act in this manner, by causing irritation to, and excoriation of, the mucous membrane of the alimentary track.

Idiosyncrasy and Immunity.—Mules of a large, horse-like form appear to be more subject to this disease, than those of a compact, donkey-like shape. Grey mules are more liable to it than those of other colours. Possibly, the influence of constitutional hardiness may be apparent here. Horned cattle possess entire immunity; the reason for this appearing to be, that the parasite, as may be seen by the microscope, will not attack the red corpuscles of the blood of cattle. Horses, ponies and mules, are all equally subject to it. It can be communicated to dogs and monkeys.

Period of Incubation.—Counting from the first appearance of a marked rise in the internal temperature, the period after inoculation, in the case of mules, with blood which contained parasites, is about five days; after giving the virulent blood as a drink, about six days. The period is longer, when blood which is taken from a diseased animal, but in which no parasites can be detected, is used; than when they are numerous and active in it. In the dog, the period is much longer than in the mule; but in the pony, and, especially, in the monkey, much shorter.

The parasite.—Under the microscope, the presence of these parasites in a drop of blood, is indicated by an irregularly intermittent quivering—characteristic of mule disease and surra—of some of the red corpuscles, which are much altered in form; although the white ones remain unchanged in appearance. After a further and careful examination of this "slightly quivering blood, we may at length see a minute thread-like organism, with eel-like movements, emerge from the mass of corpuscles and move slowly forward, or we may observe the little being tugging, with all its might, at a red corpuscle, endeavouring to detach it from its rouleau." (*Steel.*) The parasite is about $\frac{1}{6}$th of the diameter of a red corpuscle in thickness, and is from 3 to 6 times its length. It seems to have a thick body, and a spiral tail.

Duration of the Disease.—The disease terminates fatally in about one to six months.

Symptoms.—As in most other specific diseases, the first cases of an outbreak, generally, run a more quickly fatal course, than those that occur later on. "The mule becomes feverish about once in every ten days, his liver seems to be out of order, judging from the orange colour of the membranes of the eye, but he manages to do his work; so relapse after relapse is apt to occur, before the veterinary surgeon sees the patient." (*Steel.*) During the intervals, no parasites are to be seen in the blood; and the internal temperature is more or less normal. During these times, the membranes of the nose, eyes, and, especially, of the mouth, become very pale; the appetite is excessive and depraved; grain is, generally, rejected for grass, of which large quantities are greedily consumed. There is a copious flow of saliva from the mouth. The membranes of the eyes become influenced, with the result of tears flowing down the face, and leaving on it, a peculiar white mark. From the first, the animal is dull, and his movements, languid. His loss of condition, however, comes on suddenly, after a few attacks; when he, all at once, appears "all to pieces," and as if his flesh had melted off him. The skin, then, becomes more or less hidebound, dull and harsh to the touch, with great liability to bed sores. "Pain is evinced on pressure being made over the loins, and on each side of the sacrum. The breath, in some cases, is very offensive. There is continual sexual excitement in both sexes. Now and then, there are dropsical swellings of the legs. Occasionally, shallow ulcers appear on the gums, inside of the lips and tongue. Sometimes, very superficial ones appear inside the nostrils, as yellow scabs, for a day or two. Successive crops of blood spots appear on the membranes of the eyes, and are characteristic of this disease; in that they are few, or even absent, when the parasites are active in the blood; and are well marked and numerous during the decline of the fever. These, more or less, purple blood spots, are due to the transudation of blood from the blood-vessels." The freshly passed urine is clear, and of an acid reaction. If blood be drawn, it will be found to be of an abnormally dark colour, which fact, I may mention; is due to the destruction of the red corpuscles, the office of which is to carry oxygen for the purification of that fluid. In advanced cases, the cornea becomes opaque, with a tendency to ulcerate.

Mr. Steel has noticed, after death, in about two-thirds of his cases, ulceration of the stomach, which seems to be a feature of this disease, and not brought on by the administration of drugs, or irritating food; "since the lesion is present in cases which had not been treated, and which had been fed on soft well-prepared food for some months before death." This ulceration was not found by Dr. Evans, in his cases of surra.

Surra is the term by which relapsing fever in the horse is known in India, and is a Hindi word that means "rotten." Mules and camels, as well as horses, suffer from it, and dogs are susceptible to it by inoculation. Horned cattle and donkeys do not seem to become affected. It is said that the disease breaks out only among animals that have been fed on grass grown on marshy, or inundated ground. Dr. Evans found that the disease was neither contagious, nor infectious; but could be produced by inoculation; and that the germs come and go in the blood, in successive broods. Leaving out some minor differences, it is essentially the same as the Burmese mule disease. It is always fatal.

The *parasite* is similar to its Burmese counterpart.

Symptoms.—We have, as before described, the same wasting; voracious appetite; debility; staring coat; high temperature; and weeping. Usually, there are dropsical swellings about the legs; yellow colour of the membrane of the eyes, with claret-coloured blood spots on the inside of the eyelids, or, as is most common, on the haw. In the mare, the mucous membrane of the vagina is yellow, with well marked blood spots on its surface. There are distinct remissions. Dr. Evans found no ulceration of the nose, stomach, or other lesions. The glands between the branches of the lower jaw, sometimes, swell, and, even, suppurate.

Curative treatment seems of no avail.

Preventive treatment.—An outbreak of surra occurred in the Parel stables of the Bombay Tramway Company during November and December, 1888; 10 horses being attacked out of 174. These animals were exposed to cold night winds. When, however, means were taken to exclude these chilling winds, no fresh cases took place. Grass and hay taken from marshy and inundated ground, should on no account be employed for horses; as such fodder is frequently the vehicle for the conveyance of the disease germs of surra, anthrax, and other complaints.

Influenza, or Pink Eye.

Definition.—Influenza is a specific fever which appears suddenly among horses at one or more places in a district, and shows a marked tendency to rapidly spread over large areas of country, even without, as far as we can see, the aid of infection or contagion from animal to animal. In it, the usual symptoms are those of catarrh; although chest, bowel, rheumatic, or brain complications may be present, either singly or combined. It is always characterised by extreme debility. Apparently, it is contagious, as well as infectious.

Influenza is, also, known as Distemper, American Horse Disease, Pink Eye, and Epizootic Catarrh.

Nature.—When influenza invades a country, it may break out at one place, or, simultaneously, at widely distant points. It, then, is apt to spread with great rapidity, and, not uncommonly, against the direction of the wind; so that its transmission would appear to be capable of being effected independently of any carrying medium, such as air or water, or of the infective power which this disease apparently possesses. To my mind, the only theory that explains the manner in which influenza is spread, is that it is due to the development of disease germs, which, existing on the surface of wide areas of country, and, being acted upon by similar climatic influences in the same district, attain their virulent properties, in their respective localities, at about the same time.

Professor Williams considered that the outbreak of this epizootic which affected a great number of horses in Edinburgh and the surrounding districts, during the months of January and February, 1877, was due to the saturation of the ground with water owing to long continued wet weather, and advanced the fact, in support of this statement, that cases were, comparatively, very rare in stables, the floors of which were waterproof on account of being laid down with cement. This bears out, to some extent, the theory I have just mooted; for the growth of disease germs is undoubtedly assisted by the presence of moisture and the existence of bad sanitary arrangements.

It appears that influenza cannot be communicated by inoculation. Although opinions are divided as to its contagious or infectious nature; still it would be most unwise to allow healthy animals to remain in the vicinity of one which was suffering from this complaint. Bad sanitary conditions undoubtedly favour its spread. The weight of evidence strongly favours the idea of its infectious character.

It has not unfrequently happened, that stables for which influenza had showed a marked partiality, have been rendered sanitary, by taking up the flooring, and putting it down afresh, and by carefully draining the building.

Even apparently sound horses, which have been recently brought from districts in which influenza has been rife, should be isolated, for at least a week, before they are allowed to enter stables containing healthy horses.

Although the type of influenza varies greatly, both in individual cases and in different outbreaks, the cause of the disease appears to be the same in all; however dissimilar may be its manifestations. Symptoms of catarrh may be prominent in one case, or in one epizootic; those of bowel disorder in another; while symptoms of rheumatism may manifest themselves indiscriminately.

Influenza may be roughly divided as follows: (1) simple catarrhal influenza; (2) pink-eye; (3) abdominal or enteric influenza; (4) rheumatic influenza.

Some authorities consider that when the mucous membrane lining the eyelids presents a pink appearance, the disease is a different one from the simple catarrhal form; while others hold that pink-eye is but an aggravated variety of the other. For convenience-sake, I shall adopt the latter view. I may remark that this peculiar colour of the inside of the eyelids was a marked symptom of the great epizootics which appeared a few years ago in England and Scotland. In the enteric form, which is the gravest of all, the mucous membrane of the eyelids is of a brick or orange red. Hence, it would appear that the colour of the mucous membrane is regulated rather by the severity of the attack, than by any difference in the exciting cause of the disease.

The great danger to be dreaded in pink-eye is the formation of clots in the blood-vessels. In fact, we may often find a horse that was previously doing well to all appearance, die suddenly on account of the existence of a clot in the heart. I may here explain, that in the living healthy body, blood always remains fluid; but, when removed out of the vessels, it rapidly produces a clot, which is caused by the formation of fibrine, the constituents of which were previously held apart. As debility of the heart, which is a prominent feature of this disease, is one of the chief causes that induce coagulation of blood in the vessels, our efforts should be directed to maintain the strength of this organ, as well as to preserve the fluidity of the blood. Influenza, as might be supposed, is, generally, much more prevalent and virulent in dirty, damp and ill-ventilated stables, than in those which are well regulated.

Distribution.—Influenza is well known throughout the United Kingdom, North America, the Continent, and, to a less extent, in India.

Duration.—The acute stage, usually, runs its course in less than a week.

Symptoms.—The *distinguishing* characteristics of influenza are the suddenness of its attack, its epizootic nature, and the debility, depression, and rise in internal temperature (to 104°, or even to 105° F.) which accompany its onset. *Simple catarrhal* influenza, besides these characteristics, has little to distinguish it from ordinary catarrh (see page 285). In ordinary *pink-eye*, catarrhal symptoms are, usually, not well marked. An attack is not unfrequently preceded by colicky pains. There is considerable rise of the internal temperature, which may be observed, at least, twenty four hours before the manifestation of the symptoms; great debility; stiffness of the limbs and body at first; weak, frequent pulse; and a pink appearance of the inside of the eyelids. There is great dulness; in fact, the animal is in a more or less unconscious state. As a rule, the eyelids swell, and tears flow from the eyes. Constipation is generally present; although those cases in which spontaneous diarrhœa or profuse staling occurs, recover far more rapidly than the others. The stiffness of the limbs is, usually, followed by swelling of those parts, and consequent disappearance of pain. Sometimes, there is great lameness as if from inflammation of the feet. Occasionally, cough and soreness of the throat are present. Symptoms of inflammation of the lungs may also appear.

If properly treated, pink-eye is by no means a fatal disease, unless when intestinal complications ensue.

Bowel complications, when present, usually, appear along with the catarrhal symptoms, or may follow them. There is more or less continued abdominal pain. The mucous membrane of the eyelids is, generally, of a bilious red colour; and the pulse, frequent and wiry. Professor Robertson has observed blood spots (see page 412) on the mucous membrane of the mouth and tongue. Rheumatism frequently supervenes, and is often localised in the joints, and not uncommonly in the back tendons. It is apt to appear in parts that have been previously weakened by injury. The epizootic of 1882-3, which raged throughout Scotland and the North of England, and which chiefly manifested itself in the intestines, proved very fatal. The abdominal pains were not unfrequently accompanied by lameness, which was usually confined to one leg. Sometimes, a swelling containing a gelatinous-looking exudation appeared on the coronet of the affected limb.

In some cases, the liver becomes implicated, as will be evinced by the mucous membranes of the mouth and eyes assuming a yellow hue. On account of this appearance, the disease has been given, by some writers, the misnomer of *bilious fever*.

We may, also, have complications arising from bronchitis, pleurisy or pneumonia, either singly or combined.

Treatment.—One of the great secrets of success is to grapple with the disease, in its very first onset, by judicious treatment and careful nursing. During the continuance of an epizootic, every horse should be watched, and, if possible, his internal temperature taken from time to time, so that there may be no chance of his being worked while the disease is hanging over him; for, if this happens, his life may be endangered; or, at least, his recovery will be greatly retarded.

Simple catarrhal influenza may be treated as ordinary catarrh. (See page 285.) If there be constipation, give ½ pint of linseed oil as a drench, and administer an enema. Reasoning from the fact already stated, that cases in which spontaneous diarrhœa or profuse staling appears, as a rule, rapidly recover, we may conclude that it is good treatment to promote these actions. We must, however, recollect that if there be symptoms of abdominal complications, as will be evinced by continued colicky pains, a purgative should on no account be given; as its action would be directed in still further localising the malady in the intestines, and would, thus, seriously endanger the life of the patient; for the abdominal form of this disease is much more dangerous than the catarrhal one. I may remark in passing, that, if pink-eye be prevalent, a purgative should not be given to horses unaffected by this disease; for it would be likely, by weakening the bowels, to predispose the animal to which it was given, to contract the intestinal form of influenza.

We may then, in *pink-eye* if neither diarrhœa nor continued colicky pains be present, give ½ pint of linseed oil, followed by a drench composed of—

Carbonate of ammonia . .	1 drachm.
Nitre	2 ,,
Cold water	1 pint.

This drench may be given three times a day, and may be continued for three or four days, or until the severity of the symptoms abates.

If carbonate of ammonia be not at hand, we may give a drench of—

Linseed oil	8 oz.
Turpentine	1 ,,

To be repeated three times a day, in the same manner as the other drench, and an ounce of nitre in the food or water daily.

If linseed oil be not available, we may substitute for it, 3 drachms of aloes, in drench or ball. The turpentine may then be mixed up in a quart of gruel;

Linseed oil is, here, much to be preferred to aloes, as its action is less irritating to the bowels.

We should not be deterred from giving a laxative by the existence, in the animal, of great debility, which will be relieved as soon as the bowels begin to act. This seems to indicate that the weakness is caused by the presence, in the blood, of some deleterious matter which acts on the nervous system. As the bowels, in this disease, are very susceptible to the action of purgatives, we should use them only in small doses.

If there be soreness of the throat, neither carbonate of ammonia nor turpentine should be given, as either medicine would cause irritation, and, thus, greatly distress the animal. In place of them, linseed oil and nitre may be substituted, and may, respectively, be given in the mash and water.

Owing to the debilitated state of the animal, and danger of blood-clots being formed, aconite should not be given; as it is a sedative to the action of the heart. Opium is, also, contra-indicated; for its administration affects the brain, and checks excretion.

The horse should be placed in a warm, well-ventilated box, and should be carefully clothed, so as to encourage his skin to act. At first he should be fed on laxative food, but, when the acute stage has passed, his strength should be kept up by liberal feeding; two or three quarts, a day, of ale or stout being given, if necessary.

I may explain that the turpentine acts as an antiseptic in checking morbid changes in the blood; as an astringent in preventing undue transudation of serum; as a diuretic in hastening the removal of effete matter from the system; and as a stimulant in supporting the strength. Both the carbonate of ammonia (a powerful diffusible stimulant) and the nitre (a diuretic) appear to have a well-marked action in retarding the coagulation of blood in the vessels. During the progress of the disease, the animal should be freely supplied with common salt, which is not alone a useful antiseptic, but, also, tends to keep the blood fluid, and is necessary for the building up of tissue.

If symptoms of *abdominal pain* be marked, a ball or a soft mass, made up with treacle, of—

Camphor	2 drachms.
Extract of belladonna .	1 drachm,

may be given twice, or, if need be, three times a day, or $\frac{1}{20}$th of a grain of sulphate of atropine, subcutaneously (see page 574), may be used instead. Relief may be obtained by warm fomentations to the sides. If constipation exists along with the colicky pains, the bowels may be regulated by administering an enema, and giving, say, a quarter of a pint of linseed oil twice a day. If diarrhœa be present, it should not be checked, unless when it threatens to reduce the strength too much, and, then, only by giving a thin solution of starch or flour gruel, which may have some powdered chalk mixed through it.

If the *rheumatism* prove obstinate, it may be treated as described under that heading, see page 425.

Epizootic Pleuro-Pneumonia (Dry Influenza).

Although the term " influenza " should be restricted to catarrhal affections which spread over large areas of country, it is also applied to an epizootic form of chest disease, in which the symptoms of pleurisy are, generally, well marked, and are preceded by a fevered state of the system, as indicated by a rise in the internal temperature. This affection is characterised by its epizootic, or widely-spread, nature. In its severer forms, as remarked by Professor Williams, it certainly appears to be contagious, although it may not be so, when the attack is mild. The fever to which young horses recently taken up from grass are liable, and to which allusion has been made on page 354, sometimes takes this form.

Treatment.—The general treatment described on page 276, *et seq.*, should be followed here. Taking the malarious character of the fever into account, we may safely and with benefit give, at first, a dose of quinine, say, ½ oz. in a ball, and continue giving it in quantities of not less than two drachms daily. If expense be an object, or if drenching distresses the animal, the use of quinine may be dispensed with. The earlier cases are taken in hand, the more successful will be the results.

Strangles

May be defined as a specific fever which manifests itself by catarrhal symptoms and usually by abscess under the jaw.

It principally attacks horses between the ages of two and six years, and rarely affects the same animal twice. In these respects, and from the fact that a large proportion of colts and fillies suffer from it, it may be said to bear the same relation to the horse, as distemper does to the dog; or measles, to man. Opinions are divided as to its power of occurring spontaneously, and, also, as to its infectious character. The weight of evidence, however, is in favour of its being capable of being communicated from horse to horse. Even if mild cases are not infectious, there appears to be little doubt but that the severer forms are. There is also, some doubt as to its power of being propagated by inoculation. The crowding of young stock certainly favours its spread.

As carefully-reared puppies will, generally, escape distemper; so will young horses, if equally well attended to, and brought up singly or in small numbers, usually, remain free from strangles. Animals reared in the open, are, undoubtedly, less liable to it than those brought up under conditions of crowding.

The Parasite.—Dr. Schütz, of Berlin, has found the microbe of strangles. This coccus forms rosary-like chains which are deeply stained by gentian violet and methyl-blue. He has made several pure cultivations, in and on different media, and then produced the disease by inoculation. Dr. Raymond, F.R.C.V.S., by independent observations, has confirmed Dr. Shütz in the finding of this strepto-coccus in all pus collected from the abscesses of strangles.

Symptoms.—In ordinary mild cases, the horse is dull, off his feed, and slightly feverish. There is, usually, cough and a discharge from the nostrils, which is watery at first, and thick later on. An abscess forms in the hollow between the branches of the lower jaw, and comes to a head in about ten days. There is, generally, more or less difficulty of breathing on account of the swelling. In some cases, for a month, or even more, before the abscess appears, the animal loses condition; his coat stares; he becomes "hide-bound;" has a cough, and is "out of sorts." This state has been sometimes mistaken for glanders. In simple strangles, there is only one tumour, which, as a rule, is clearly defined.

The abscesses, in all cases of strangles, are connected with glands.

Bastard, Malignant, or Irregular Strangles is the term applied to a very serious variety of this disease. Several indolent swellings form in various tissues, and do not come to a head, after running a regular course, as does the abscess of simple strangles. As a rule, these swellings appear between the branches of the lower jaw (their typical position), at the base of the neck, at the point of the shoulder, under the shoulder-blade, in the chest, or in the abdomen. When they are under the jaw, they remain hard and indolent, and may, even, diminish in size. "At other times, particularly when affecting the lymph-glands at the point of the shoulder, the abscess is of great extent, and the pus well formed." (*Robertson.*) The internal glands which are usually affected, are those of the mediastinum and of the mesentery; the former being the partition that divides the cavity of the chest into two parts; while the latter is the membrane that suspends the intestines from the roof of the abdomen. In both cases a fatal termination may be expected. When the mediastinum is involved, there is cough, difficulty of breathing, and dropsical swellings of the chest. When the abscesses occur in the mesentery, "the most prominent and characteristic sign is a total loss of appetite, or an apparent loathing of food associated with occasional colicky pains." (*Williams.*) The existence of these pains points to interference with the action of the intestines.

In irregular strangles, the febrile symptoms are, generally, better marked than in the simple form; especially, when the internal organs are involved. If the temperature rises to 104° or 105° F., we have gocd reason for concluding that an internal abscess is in course of formation.

Treatment.—If the animal be at grass, he should be taken up and put into a comfortable stall, which should possess every condition necessary for health ; such as, proper ventilation, good situation, and freedom from crowding. Give a laxative, though fairly generous diet, which may consist of bran and linseed mashes, gruel, boiled barley, carrots and freshly-cut grass. If there be constipation, administer an enema, and, if necessary, give half a pint of linseed oil as a drench. It is advisable that the bowels should be regulated by the nature of the food. Half an ounce of nitre may be mixed daily in the water. Valuable horses, and, especially, those that are suffering from the dangerous form of the disease, may, if the swelling at the throat does not render balling or drenching dangerous, get 2 drachms of quinine twice a day until the bodily temperature (normal, 100·5° F.) is reduced to the usual standard. If difficulty of swallowing exists, 1 oz. of liquor arsenicalis given in the food for a week, may be substituted for the quinine. The swelling under the jaw should be frequently fomented with warm water; while at other times, the part should be kept warm by means of wool or flannel. The abscess should be opened with the knife when it becomes soft and "points." The part should, then, be bathed with warm water, and a small piece of lint inserted in the opening, in order to facilitate the discharge. Professor Williams recommends that, if the tumour delays coming to a head, a fly blister should be applied over it, and, twenty-four hours after, a warm poultice. The part should be shaved before being blistered. Premature lancing of the swelling should be avoided, as it will tend to induce the abscess to re-form.

If the breathing becomes painful, the horse may be made to inhale steam from boiling water mixed with a quarter of a pint or so of oil of turpentine, the action of which is to accelerate the discharge from the nostrils. If the breathing becomes very difficult—the animal fighting for breath—tracheotomy (see page 576) must be performed.

During the after treatment, the horse should be liberally fed and may have a couple of quarts of beer a day, with half a drachm of sulphate of iron in his food daily. As there is danger and difficulty in drenching, that operation should be dispensed with, as much as possible. In all cases, the horse should be carefully nursed and his strength kept up.

Roaring, due to alteration of structure of some part of the air passages, and blood-poisoning (pyæmia) are the chief after-effects to be feared from an attack of strangles. The fact of a horse having safely passed through this disease, certainly tends to increase his value.

Anthrax, or Loodiana Fever.

Synonyms.—Horse Plague, Charbon, Gloss-anthrax.

Definition.—A specific fever which runs a rapid and generally fatal course, and is characterised by an imperfectly oxidised condition of the blood, which becomes thick, dark coloured, and more or less incapable of supporting life.

Distribution.—This disease is widely distributed over the world, although it is comparatively rare in England. It is well known in India as Loodiana Fever, and is frequently met with on the Eastern frontier of Bengal; particularly among the ponies of the Munipur country.

It is not confined to horses, but also attacks cattle, buffaloes, sheep, pigs, elephants, deer, and almost all the larger animals. Those which feed on herbs appear specially liable to it. It can be readily communicated to man, and then takes the form of "malignant pustule" (woolsorters' disease). Hence, the attendants on an animal suffering from this disease, should be most careful in guarding against the possibility of their becoming inoculated by its virus.

Varieties.—Strictly speaking, there is only one kind of anthrax; although, for convenience sake, we may divide it into anthrax accompanied by swelling of the throat and neck, and into anthrax without this symptom. In the former case, the seat of the disease seems to be chiefly located in the organs of breathing; in the latter, in the abdomen. The one might be termed the thoracic form; the other, the abdominal.

Symptoms.—There is a marked rise in the internal temperature, which not very unfrequently exceeds 107° F. The horse, with little or no warning, becomes dull, the appetite fails, and there is great debility. The pulse is frequent and weak. The lining membrane of the nostrils, and that of the eyelids, assumes a bilious red colour. The breathing becomes greatly quickened; and the nostrils, widely dilated. On this account, and from the red appearance of the mucous membrane, cases of this disease have been mistaken for those of congestion of the lungs. When affected by the latter complaint, however, the animal fights for breath, and does not exhibit the depression and semi-unconsciousness of one suffering from anthrax. The breathing, which is almost entirely abdominal, as may be seen by the heaving of the flanks, becomes more and more hurried, until, at last, the animal falls from exhaustion, becomes convulsed, and dies, apparently, from suffocation. There is sometimes a flow of rusty-coloured fluid from the nostrils, and, often, towards the end, or after death, a discharge from them of foam more or less tinged with blood. Colicky pains are frequently present. The disease may kill in three or four hours; while in cases in which the symptoms are less marked, the animal may linger on for a few days.

In cases in which there is swelling of the neck, that part and the space between the branches of the lower jaw swell, often, to an enormous extent, so that the head and neck become hard and immovable, as if they were cut out of a single piece of wood. The amount of swelling, however, greatly varies. *Gloss-anthrax* or *blain* is described as a variety of this form, and is said to be characterised by the tongue being the chief seat of the local manifestation of the disease. It becomes greatly swollen, dark coloured, and covered with blisters and sores; and the mouth becomes filled with thick, stringy saliva. I have never seen a case of gloss-anthrax.

In the abdominal form of anthrax, the rectum is sometimes turned inside out. There are, in some cases, tumours containing yellow fluid (*serum*) about the flanks, under-part of the belly, or scrotum.

Professor Williams describes a form of anthrax in which painful tumours, about the size of a walnut, may be felt under the skin, which is dry and hot. When these tumours are "touched by the hand, a local shivering like a subcutaneous beating, is felt: this character is special to charbon." In the many cases of anthrax I have witnessed, the swelling was always of a more or less diffused nature.

To sum up, I may state that the symptoms of this disease are those of impeded respiration, and of infiltration into the various tissues. Hence, the painful breathing, the interference with the functions of the brain, the semi-paralysed condition of the patient, and the local swellings.

Prospect of Recovery.—The only cases that are at all hopeful, are those in which the rise of internal temperature is not very great.

Rate of Mortality.—It is most difficult to give even an approximate answer to this question. I may, however, venture to say that, in Loodiana fever, the recoveries, under good treatment, average about 20 per cent. of those attacked.

Post-mortem Appearances.—The venous blood looks like so much liquid tar; and the arterial is thick and dark-coloured. The blood from both systems of vessels coagulates far less readily than in health. The colour of the lungs varies from dark red to black. The various internal organs, as well as the other structures, are, frequently, discoloured by the infiltration of dark, altered blood. The spleen "is soft and broken down, resembling a bagful of fluid blood." (*Nunn.*) The spleen in the large marjority of cases, is much heavier than usual. When swellings have appeared about the neck, a large quantity of thick yellowish fluid will be found under the skin of that part. Similar fluid may be found in the interior of the chest and belly. The mucous membrane which lines the windpipe exhibits an inflamed appearance. The air passages are often filled with bloody foam. The *rigor mortis* lasts but a short time, and the body rapidly decomposes.

Persons who are making examinations after death, of animals that have died of anthrax, should remember that they may get inoculated with this most virulent disease, by the smallest drop of the blood, or of the discharge from the nostrils.

Nature of the Disease.—As a rule, the blood of animals which have died of anthrax, is found to contain certain microscopic bodies of a characteristic rod-like form, and about the one three-thousandth part of an inch in length. Under favourable conditions, the rods lengthen out into filaments, in which, by the aid of a microscope, may be observed, round, glistening objects that are the spores or seeds of these bacteria (see page 353). It seems, from the experiments of Dr. A. Archangelski, that these spores have the power of multiplying themselves as long as air is excluded. In the presence of air, however, they form rods, which increase and form filaments. He observed that the spores are invariably to be found in the blood of animals affected with this disease; and that the rods require the presence of air for their existence and development. Hence, it may often happen that, in cases which run a short and fatal course, no rods are found after death; only spores. When these organisms gain entrance into the blood, they rapidly multiply to an enormous extent. Professor Toussaint maintains that, in anthrax, death is caused by an innumerable number of these bacteria gradually blocking up the capillaries (the minute blood-vessels which connect the arteries and veins together), particularly those of the lungs, in which these bodies act as a mechanical obstruction to the passage of the blood. Hence, the animal dies from suffocation by reason of the blood being prevented from taking up oxygen from the air, which the patient vainly breathes. Other authorities, however, consider that these organisms cause suffocation by using up the oxygen which is in the blood. In either case, the blood would become thick and dark coloured.

The anthrax germ gains entrance into the blood by means of the forage which the animal eats, and, also, by the water it drinks, as has been frequently proved by the fact of the disease having been communicated by contaminated drinking-water. It even appears that fish may become affected with anthrax. M. Pasteur, when experimenting on animals to whom he gave forage moistened with a fluid containing these germs, found that the animals' liability to contract the disease in this manner was greatly increased when their mouths were sore, and when the food contained rough substances, such as thistles, which were apt to wound the mucous membrane of the mouth. He also found that the mouth was almost always the part which first became affected. These observations, as well as other facts, warrant us in thinking that the disease is communicated by inoculation.

An attack of anthrax, like one of small-pox in the case of the human being, confers almost complete immunity from a subsequent one.

M. Pasteur maintains that it is possible to confer on animals immunity from this disease, by inoculating them with specially prepared, attenuated anthrax virus. The question as to the benefit of this method as regards horses has not yet been settled.

Professor Feser has proved by experiment, that a pregnant animal, if suffering from anthrax, does not transmit the disease to the fœtus; for the membranes which envelop it, appear to act as a filter in preventing the passage of the "rods."

Want of drainage and unsanitary conditions seem to be the two great influences which favour the spread of these bacteria, in the same manner as they do other low forms of vegetable life. Thus, we find that draining, clearing, and tilling land infested by these disease-producers, have, in numbers of cases, resulted in rendering such pastures healthy. The same may be said as to covering the floors of infected stables with concrete, and draining and ventilating these abodes.

"Evidences," as regards Loodiana fever, "are rapidly accumulating to prove that the virus of the disease is brought to troop horses with the grass grown upon inundated soil, especially the creeping grass. Horses fed upon rumnah grasses cut above ground are far less subject to the disease than those fed on the common huryali, which is cut on or below the surface, and has much of the soil brought in with its stem." (*Veterinary Returns of the Madras Army.*)

Anthrax appears to occur at all altitudes and in all latitudes.

Professor Bollinger states that ground impregnated with the blood or dung of animals suffering from anthrax, will remain virulent for a long time. This will be especially the case, if the soil in question be soft, damp and badly drained. The same authority considers that flies play a large part in distributing the disease.

M. Pasteur points out that if an animal which has suffered from anthrax be buried under ordinary conditions, the ground immediately over the carcass will, in a short time, become infested with these germs, owing to the fact of earth worms bringing them to the surface. Hence, the dead bodies and excreta of such animals should, if possible, be burnt.

Anthrax germs will retain their vitality for years when kept in a dried condition. The action of boiling water, and of certain antiseptics, such as corrosive sublimate and carbolic acid, destroys them.

The virus of anthrax would appear to be "fixed," and to be conveyed to the system, as a rule, by direct inoculation, or by the agency of the food and water, and not by the air. This supposition, however, should, on no account, induce us to relax precautions against infection. The disease appears to remain persistent in certain places and localities which are suitable to the growth of its germs. As might be expected, marshy ground with little or no surface drainage, is peculiarly favourable to their development.

Period of Incubation.—Gerlach has shown that the period from inoculation to the time the disease manifests itself, varies from two hours to three days. It appears, from the experiments of Toussaint, that the larger the amount of virus received by an animal, the more rapid will be the course of the disease. Forty-eight hours is considered to be about the ordinary time.

Duration.—The usual apparent duration of the attack, in fatal cases, varies from twelve to forty-eight hours. Some cases terminate fatally in as short a time as three hours; while others may linger on for five or six days.

Identification of Anthrax.—If any doubt exists as to the nature of the disease, we may inoculate, with blood obtained from a horse which has died of it, other animals, such as rabbits, mice, or guinea pigs. The last mentioned are very susceptible to the virus.

If it be desired to keep the blood for future microscopic examination, a little of it may be carefully dried on a piece of glass, or sealed up in capillary tubes, such as those made for holding vaccine lymph. Some of the nasal discharge, which is generally full of the "rods," should be similarly treated. If slides and covers, such as are used in microscopic work, are at hand, they, of course, would be employed to mount and preserve the specimens.

Sanitary Measures.—When an outbreak of anthrax appears among a stud of horses, they should be removed, if possible, to some dry, healthy position. The whole of them should be kept apart from other animals; and there should be a further division made between the sick and apparently healthy. In effecting this, the clinical thermometer will be found to be of great use. The water and grass, or hay should be changed. Special care should be taken to avoid the use of grass grown near water which is of a marshy nature, or which has been liable to polution from sewage. The flooring of the stables, before the horses return to them, should be dug up for a foot or two, the old soil removed, fresh earth filled in, and concrete, which should be liberally treated with crude carbolic acid, laid down.

The bodies of animals which have died of anthrax, should, if possible, be burnt. If this cannot be done, it would be advisable to bury them deeply in dry sandy soil, and use crude carbolic acid, or any other available antiseptic, such as common salt, freely over them.

Treatment.—Give, as recommended by Mr. Fred. Smith, A.V.D., 1 oz. of carbolic acid in a quart of water, and a drachm every hour afterwards as long as required. Inject under the skin, with the hypodermic syringe, at various points where the swellings appear, a solution of carbolic acid and water, 1 to 40. Following the method successfully adopted by doctors in the treatment of malignant pustule, we may, if distinct tumours are observed, make a bold cross-shaped incision into them, as early as possible, and treat the wound with undiluted carbolic acid, the action of which is to check the development of the disease germs. Instead of carbolic acid, we might use

Jeyes' Fluid; or we might give, as advised by Mr. Smith, an ounce of pure iodine in a ball, followed by half an ounce every four hours.

Cape Horse Sickness.

This disease, which is widely distributed throughout South Africa, has been considered to be Anthrax, on account, no doubt, of the almost identical character of their symptoms. Mr. J. A. Nunn, F.R.C.V.S., who has specially investigated the former, is, however, of opinion that it is entirely different in its nature from the latter. He considers that it is neither contagious nor infectious; and that it cannot be communicated by inoculation to either horses, cattle, or men. He, also, states that, after death, the spleen is almost, if not quite, in a normal condition. In all these particulars, it, certainly, differs from anthrax. He mentions as a point of dissimilarity, that in Horse Sickness, "froth exudes from the nostrils, after death, in a white mass, like cotton wool." I have seen the same thing occur in cases of anthrax, in Eastern Bengal, except that the foam was partly tinged with rusty coloured blood. Cattle, I may mention, seem to be more susceptible to anthrax, than are horses; yet they are unaffected by Cape Horse Sickness, which seems to be peculiar to solipeds. It appears to be a disease of summer and that it vanishes on the approach of winter. It is widely spread throughout Africa. Dr. Fleming mentions that the Italian Government horses suffered from it during the occupation of Massowah. Horses that are carefully stabled, are not taken out between sunset and a little after sunrise, and are not allowed to eat grass with the dew on it, do not appear to get the Cape disease, which I may add, is most prevalent during damp weather. Donkeys are supposed to be exempt from it; and mules to be less liable than horses. An attack of anthrax appears to confer on a survivor far greater immunity from a second attack than is the case with Horse Sickness, which runs a quicker course, and has a greater percentage of deaths than the other.

In cases of Horse-sickness, Mr. Nunn found specific germs, which bore a strong resemblance to the *bacillus anthracis*; but only after death, could he detect them. I may fairly say that the nature of this disease remains in an undecided state at present.

Respecting the virulence of some outbreaks of Cape Horse Sickness, Mr. Crawford, veterinary officer of Pietermaritzburg, writes in 1887: "This and last season were terrible ones for Horse Sickness. Nothing appears to do any good; and as for medicines, it is simply waste of good drugs to administer them; for the malady is seldom noticed before the case is hopeless. Many cases are simply marvellous in their suddenness. Horses will eat their feed heartily, are then saddled up and taken on parade; but before they move off, they become so sick and helpless that they cannot be got to the sick lines. I have seen horses ridden down to water, and apparently to be in perfect health, but have never got half way back to their lines."

Cerebro-Spinal Fever

Is a non-contagious disease, which rapidly spreads, like influenza, over large areas of country, and is characterised by disturbance of the brain and spinal cord, with consequent, and more or less complete, paralysis of the hind quarters. It appears to be a true specific fever. (See page 351.)

The attack may be sudden, or may take two or three days to become developed. The most prominent symptoms are: unconsciousness, with or without excitement; and paralysis of the hind limbs. Spasms and convulsions not unfrequently supervene. "Very early in the affection, and all through the disease, unless when the brain lesions are great, pain is evidenced on pressure being exercised with the fingers along the spine." (*Robertson.*) In some cases, the attack is mild; in others, it destroys life within twenty-four hours. As a rule, the more gradual is its approach, the less severe will be the symptoms. It has a marked tendency to recur after a few days. Observation of the internal temperature does not always afford reliable information about this disease; for, even in severe attacks, the temperature, in different instances, may be respectively, high, low, or normal.

Cerebro-spinal fever is well known in the United States, and is, also, met with in some parts of the Continent.

The coverings of the brain and spinal cord, as well as a portion of their substance, in an animal that has died from this disease, will be found to be congested and more or less altered in structure.

When this complaint breaks out, it almost invariably does so during the cold months of the year. Unhealthy surroundings do not appear to influence its spread in any way.

The death-rate, according to Professor Robertson, may vary from 10 to 80 per cent. The attack, in fatal cases, usually runs its course within a week, not counting relapses.

Treatment.—If possible, we should place the animal in slings without delay, in order, by gravitation, to relieve, to some extent, the congestion of the brain and spinal cord. "Unless the patient is slung within twenty-four hours from time of attack, there is but slight hope for a recovery." (*Mr. Lyman, M.R.C.V.S.*) We may give a mild dose of aloes, and a couple of drachms of belladonna, once or twice in the day, or inject atropine subcutaneously; and we may apply bags of pounded ice to the spine. Up to the present, medicine does not appear to have any well marked power in controlling the effects of this disease.

Glanders and Farcy

Are different forms of a specific fever, which is caused by the entrance into the body of a particular kind of disease germ. It is both contagious and infectious. When the malady is manifested by discharge from the nose, ulceration of the mucous membrane which lines the nostrils, swelling of one or both of the lymphatic glands that are between the branches of the lower jaw, and by a certain morbid condition of the lungs; it is called "glanders." When, however, the chief seat of the disease is in the tissues immediately under the skin, it is termed "farcy." If the symptoms of both forms are developed in the same animal, the sufferer is said to be glandered and farcied. A glandered animal appears as liable to communicate farcy as glanders; and *vice versâ*. "The common termination of farcy, if a horse affected by it be allowed to live a sufficient length of time, is glanders, and of glanders, farcy." (*Williams.*)

Cases of chronic glanders, which exhibit a certain amount of ulceration in the nostrils (termed *sub-acute glanders* by Percivall), are much more common than those of the acute form among horses; although the opposite to this seems to hold good with donkeys and mules.

Glanders—using the term as also applied to farcy—is a distinct disease of itself; as infection or inoculation, with any kind of morbid material, cannot produce this malady, except from a glandered animal. The virus of glanders will produce glanders only. It may be propagated by infection, by inoculation, and by the unhealthy discharge from the nostrils coming in contact with the mucous membrane; and, consequently, if introduced into the stomach.

Professor Williams maintains that it may become spontaneously developed by defective sanitary arrangements, and as a result of long-continued and debilitating diseases. Cases have occurred on board ship, in which glanders appeared among a number of horses after they were battened down for a few hours during bad weather and were, thereby, kept in a poisonous atmosphere for that time. Almost every eminent pathologist, however, regards glanders as a disease which cannot be spontaneously developed. There is no doubt that this affection is caused by the entrance into the blood, from without, of specific bacteria (see page 353); and that conditions, such as bad sanitary arrangements, ill-health from diabetes, influenza, malignant strangles, etc.—which seem to give rise to spontaneous cases—act only in predisposing the animal to the attack. I may remark that these apparently spontaneous instances of glanders break out only among horses, asses and mules, but never among other animals: a fact which has been advanced to prove the spontaneous origin of this disease.

Glanders is unknown in Australia and New Zealand. Owing to defective stable management, it was formerly very common in England, but is now rare; except in London and other large towns.

Neglected cases of influenza and nasal gleet are not uncommonly mistaken for glanders by inexperienced persons.

Glandered horses who presented no outward symptom of the disease, but whose lungs only were affected, have been known, not uncommonly to infect animals into whose near vicinity they have been brought, so virulently, that the latter died in a short time from acute glanders, though the former continued in apparent health. Hence, we should use the utmost care in dealing with suspected cases.

The virus of glanders is destroyed by water at a temperature of 133° F.; by carbolic acid; and by some other strong antiseptics. When dried, it retains its virulence for several months, or, possibly, even for years.

The virus appears to be volatile as well as fixed; that is to say, the disease can be carried by the air without actual inoculation. Sad cases have happened of persons, who lived in lofts above stables in which glandered horses were kept, contracting this disease without any evidence to show that they were brought into immediate contact with these animals. These instances, however, must be regarded as exceptional, if we consider the number of men that have been engaged as grooms to glandered animals, without catching the disease. Men are certainly much less susceptible to it than are horses and donkeys. Horses in the same stable as a glandered animal have frequently been known to have contracted the disease, although their stalls were a considerable distance from that of the affected one, while there was no apparent possibility of the disease having been communicated by contact, either directly or indirectly. Horses which have open wounds, such as those that have been recently castrated, appear to be much more susceptible to the contagion than are those whose skins are intact.

The virus of glanders is most readily communicated by inoculation with the morbid discharge from the nostrils, the mere contact of which with any of the mucous membranes is sufficient to give rise to the disease. Hence, it is advisable, when examining a suspected horse, to be very careful to avoid the possibility of his sneezing or coughing in one's face. Glanders-tainted blood, if injected into the veins of a healthy horse, will produce glanders; but it is not such an active agent as the morbid discharge from the nostrils. It is said that the disease can be communicated by the milk from a glandered mare. It appears, according to some observers, that it can be propagated by means of exhalations from the lungs and skins of affected animals.

We learn from the researches of M. Choisy and Professor Nocard, that glanders can be transmitted from the mare to the fœtus.

Professor Babès, of Bucharest, has demonstrated that the bacillus of glanders may penetrate into the skin, without the aid of any existing wound; as it can gain entrance into the hair follicles, where it will multiply. It will, there, soon cause ulceration of the skin, and will then infect the skin. The moral is obvious.

It is notorious that ill-ventilated and badly kept stables, in which horses suffering from glanders have resided, will retain the virus of this disease for a long time after the removal of the glandered animals, and even after the most carefully executed process of disinfection. Livery stable keepers should, therefore, be extremely cautious about engaging premises in which glanders has once appeared; for, if it breaks out again among horses under their charge, they will, probably, be liable to the owners for the value of the affected animals.

Susceptibility.—Asses and mules appear to be more susceptible to the contagion than are horses. Men, sheep, goats, dogs, cats, mice, and rabbits are also liable to it; but horned cattle, pigs and fowl seem to possess perfect immunity from it. Individual idiosyncracy is, here, well marked; for some horses resist all attempts to communicate the disease to them. All animals suffering from it can, respectively, communicate it to others that are susceptible to it, as well as to man, and *vice versa.* The disease is equally virulent whatever may be the species of animal from which it is taken. According to Dr. A. E. Durham, in cases of men affected by chronic glanders, about fifty per cent. of deaths occur. Only two or three recoveries from the acute form are on record.

Period of Incubation. — After inoculation, glanders usually manifests itself in from two to seven days. The period of apparent latency in cases of infection is much longer, and may extend even to months. Probably, these instances of seemingly prolonged incubation are due to the fact of the disease having been confined to the lungs and other organs which are hidden from view. As a rule, the longer the period of incubation, the less virulent will be the attack.

Varieties.—Both glanders and farcy are respectively divided into acute and chronic, according as their development is rapid or slow. Chronic farcy is considered to be curable in mild cases; but the keeping alive of an affected animal is so fraught with danger to the life of both man and beast, that, apart from legal considerations, an owner would hardly be justified in permitting a glandered or farcied horse to live. The appropriate treatment would be the administration of strong antiseptics, such as arsenic and quinine, and the destruction of the abscesses by the firing iron.

Nature of the Disease.—It seems probable that glanders—using the term as, also, applicable to farcy—is, first of all, developed in the blood—whatever its origin may be—and is then manifested in the form of characteristic nodules or tubercles (if I may use the term) which appear in various tissues. These tumours rapidly soften, and are converted into abscesses or ulcers, which eat into the surrounding tissues and show but little tendency to heal. The lymphatic vessels of the affected part become charged with virulent material, their office being to remove waste products, and, consequently, become inflamed. Speaking broadly, we may say that when the tubercles are chiefly confined to the lungs and other internal organs, the disease is chronic glanders; when the air passages as well as the lungs are implicated, it is acute glanders; if the tubercles are superficially manifested, farcy follows; and that a combination of the two forms of the disease is consequent upon an extended invasion by the tubercles. Again, the degree of malignant activity of the tubercles, as well as their number and position, doubtless influences the form of glanders which the disease will take: whether acute or chronic. As Dr. Fleming remarks, difference of intensity is the only difference between chronic and acute farcy. It is probable that individual idiosyncracy, as well as external conditions, will influence the disease as to its point of attack.

The apparent reason for the submaxillary glands being affected, is that they receive the lymphatic vessels of the nasal cavities, in which ulcers are found and, consequently, become irritated by the morbid material drawn off by these vessels.

The great rise of temperature is due to the diseased changes that take place in the blood and tissues.

Symptoms of Acute Glanders.—This form may be the first to attack the horse, or it may be the termination of chronic glanders or of farcy. More or less persistent shivering fits ; a marked rise (often of 7° or 8° F.) in the internal temperature of the body (normal, about 100·5 F.), and, consequently, more or less fever, usher in the attack. The coat is dry and staring; the pulse frequent and weak ; the breathing hurried ; and the animal rapidly loses " condition."

The characteristic mark of glanders is the formation of nodules, which are sometimes scattered ; at other times, clustered together. They suffer degeneration, and form abscesses of varying size, and, generally, contain pus (matter). In acute glanders, these nodules or tubercles, which are about the size of small shot, are seen in the mucous membrane which lines the nostrils ; chiefly, as a rule, on the partition *(septum nasi)* which divides the nostrils one from another. They "appear as projections on an elevated and injected base or background, and are rendered visible by the white or yellowish-white centre. This centre is surrounded by a greyish transparent zone, which again is encircled by a red areola." (*Robertson*). In a few days these nodules soften, burst, and form ulcers, which resemble in appearance hard syphilitic chancres, having hard, dug-out edges. These ulcers show no disposition to heal, but run into each other, and extend superficially as well as deeply. These abscesses, probably, first appear in the lungs, then, in the various air passages, in the sinuses of the head, and, also, in the various internal organs, muscles, etc. Owing to their presence, the affected animal suffers from the so-called bronchitis and pneumonia of glanders. A thin discharge issues from one or both nostrils. At first, it resembles that of ordinary cold; it then assumes a sticky or starchy character, and soon becomes mixed with pus and blood, on account of the bursting of the abscesses. The lining membrane of the nostrils becomes much inflamed and assumes a purple or coppery hue. The glands and lymphatic vessels of the head become swollen, especially the lymphatic glands (submaxillary) which lie in the hollow between the angles of the branches of the lower jaw. In chronic glanders, one or both of these glands become firmly adherent to the jaw. In the acute form, however, the animal may die before this can take place. The eyes are, generally, weak and watery.

Symptoms of Chronic Glanders.—The approach of this form is extremely insidious, there being, often, nothing to mark it beyond a slight discharge from the nose, and the fact of one or both of the submaxillary glands being hard and swollen; while no ulcers may be visible inside the nostrils. There may be even no discharge or swelling of the glands at first; or these symptoms may appear and disappear from time to time. Also, there may be swelling of the submaxillary gland or glands without any discharge from the nose; in which case, the horse is said to be "jugged." The coat loses its bloom, and the animal sweats from comparatively slight exertion. Further than this, there is little sign of constitutional disturbance. A horse may continue in this state for many months; but at last his general health breaks up, or acute glanders sets in, and he dies.

The discharge of chronic glanders is, at first, similar to that of common cold, but soon assumes the appearance of boiled starch or white of egg. It is sticky, and dries round the edge of the nostrils. If there exist ulcers in these cavities, the discharge will, naturally, become mixed with pus and blood. It usually issues from only one nostril, which will be that of the affected side—the left, as a rule—but may proceed from both. The diseased nostril "will be found to be paler in colour than natural, or, perhaps, tawny, coppery, and sometimes of a dull leaden hue." (*Williams.*) There is swelling of the submaxillary gland or glands of the affected side or sides. The swelling is hard and adherent to the jaw. If both nostrils are affected, there will be a tumour on each side. When only one suffers, the eye on that side will be smaller and weaker than its fellow; and, frequently, there will be a flow of tears from it.

In chronic glanders, attempts at healing are sometimes made by the ulcers inside the nostrils.

A horse is said to have *sub-acute glanders* when the disease takes a more or less chronic form, with ulceration in the nostrils. The term is, now, seldom used.

Pulmonary Glanders is a variety of the chronic form in which the disease is almost entirely confined to the lungs. There is no discharge from the nose nor swelling under the jaw. There is a dull, dry, soft cough; the animal loses condition, is weak and languid; and the sounds of the chest are those of chronic pneumonia. The animal may thus drag on a miserable existence for months, and at last die of debility without exhibiting any further symptoms of glanders, and yet be capable, all this time, of infecting horses stabled near him. Or he may be suddenly carried off by an acute attack. "It will be found that the nodules in the lungs will vary in size from a pin's head to a pigeon's egg, or even larger." (*Williams.*)

Distinguishing Glanders from other Diseases.—We should remember that the three characteristics of glanders are: discharge from the nose; ulceration of the mucous membrane of one or both nostrils; and a tumour (generally adherent in chronic cases) on one or both sides of the submaxillary space. In doubtful cases, it is advisable to inoculate some worthless animal with the discharge from the nostrils of the suspected horse. As glanders in donkeys is generally of a well-marked and virulent type, these animals are fit subjects for such experiments, which should not be made unless the stake at issue is of sufficient importance to justify the cruelty. Or an attempt may be made to bring about the speedy development of the disease, which may be done by giving the animal daily fifteen grains of bichromate of potash for two or three days in its food, or a dose of physic, which should be administered by a stick or balling pistol.

In influenza, there is often running at the nose, and swelling of the submaxillary glands. As pointed out by Percivall, in distinguishing glanders from catarrh, the absence of cough, or soreness of the throat, will strengthen our suspicion of the existence of the former disease.

The discharge of nasal gleet differs from that of glanders in having a yellowish-white and creamy appearance, and in not adhering round the nostril from which it issues.

Horses which come from a glandered stud should be viewed with great suspicion; especially, if they evince a tendency to shiver, or have a rough, staring coat. The clinical thermometer will be of great use, here, in arriving at a correct conclusion.

Professor Robertson justly remarks that we should never give our opinion in the affirmative on a case of glanders, unless the characteristic ulcers are present in the nostrils, or unless the suspected animal has been the means of communicating the disease to a healthy one, by inoculation or by infection.

Symptoms of Acute Farcy.—In this form we have the same signs of constitutional disturbance—shivering, rise of internal temperature, etc.—as in acute glanders; though, generally, not to the same extent. The local symptoms are manifested by a painful swelling, usually, of one hind limb, although other parts may be invaded. In a day or two, on the swelling somewhat subsiding, or without this taking place, nodules, or "farcy buds," and enlarged lymphatic vessels ("cords"), of about the size of a goose quill, appear on the surface. These tumours, which are hard and painful to the touch, are, generally, found clustered together and away from the joints. They, usually, break out on the insides of the thighs and fore-arms, or on the neck, and are about the size of a marble. They rapidly soften and form unhealthy ulcers which have a tendency to run together, and are very similar to those met with in the nostrils of glandered animals. An abundant discharge of a dirty yellow colour, and tinged with blood, issues from these ulcers and dries on their edge, or may overflow on the surface of the part. The enlarged lymphatic vessels have, along their length, prominent swellings, which mark the position of their valves that have become inflamed from the presence of the virus in the fluid which circulates through these vessels. These tumours, also, suppurate and form ulcers similar to the others. Thus, as pointed out by Professor Robertson, we have two sources from which the ulcers arise. Both the fever and swelling are more or less remittent; the latter, sometimes, subsiding in one limb and then appearing in the other. The animal rapidly loses condition and dies from exhaustion, or from an acute attack of glanders.

Professor Williams remarks that farcy may first manifest itself by painful swellings in the flexor tendons, or by rheumatic symptoms.

The onset and course of glanders and farcy have far from a uniform character in their manifestations.

An attack of acute farcy will run its course to a fatal termination in about a month.

Symptoms of Chronic Farcy.—This form differs from the acute in being much milder. There is but little constitutional disturbance; and the tumours may remain indolent for a long time.

Chronic farcy is much more common than acute farcy, and, probably, than either form of glanders.

Distinguishing Farcy from other Diseases. — The symptoms of farcy may be confounded with those of lymphangitis, purpura, or horse-pox. The presence of the hard, painful and "beaded" lymphatic vessels, and the existence of unhealthy, spreading ulcers will be sufficient to distinguish farcy; while the success of the inoculation test will be conclusive. The swellings of purpura generally form near joints, and thus differ from those of farcy. Diuretics and aperients which are indicated in lymphangitis, aggravate the symptoms of all forms of glanders.

The strictest disinfecting measures should be applied to the stall, fittings, harness, clothing, etc., after destroying the diseased animal.

Horse Syphilis.

In the remarks here made about this disease, I am indebted for material to a *Report on the Outbreak in Illinois*, by Mr. W. L. Williams, V.S., United States ; to a report published by *La Société Centrale de Médecine Vétérinaire* of Paris on M. Blaise's *Venereal Diseases of the Horse* (see *Veterinary Journal* of February, 1890) ; to Dr. Fleming's *Sanitary Science and Police;* and to Professor Williams' *Veterinary Surgery.*

Definition.— Horse syphilis is a specific contagious and non-infectious disease, which is marked by inflammation of the genital organs, followed by constitutional disturbance, and which is peculiar to the horse, mule, and ass.

Geographical Distribution.— This disease appears to have originated in the East, and to have been thence imported into Europe. It seems to be not uncommon in Algiers, from which place it has been brought into France. It has occurred in various places in Germany, Austria, Southern Russia, and Switzerland, and has been imported into America from France.

Mode of Propagation.—It appears to arise in no case spontaneously ; but to be always propagated by inoculation, generally, in the act of copulation. The blood of a diseased animal will give this complaint to a healthy one by inoculation.

Nature of the Disease.— The nature of the poison of this disease has not yet been determined. It appears first to affect the genital organs, and then various tissues throughout the system. It closely resembles human syphilis, except that it has no characteristic sore to mark its onset. Although there is a marked likeness, especially as regards constitutional effects, there is no real identity between syphilis of man and that of the horse. Human syphilis, I may remark, is incapable of being transmitted to the horse, ass, or mule. Dogs, guinea-pigs and rabbits are not susceptible to horse syphilis.

Duration.—The disease may run its course in from two or three months, to as many or more years.

Diagnosis.—As the disease is often very insidious, it is sometimes difficult to determine its exact nature, in the early stages. It might be confounded with horse-pox (see page 406). The characteristic pustules of the latter which have a depressed centre), however, terminate in shallow sores that rapidly heal up. The manifestations of the former are of a far graver character.

Chances of Recovery.—The large majority of animals attacked by this disease die from it. Many of those which make an apparent recovery have relapses and succumb, or die more or less suddenly on account of the changes it has caused in the internal organs. It is probable that with our present knowledge, a radical cure of a case of horse syphilis is not possible.

General Symptoms.—The disease runs through the same course in the mare as in the stallion; allowing for differences of structure. It varies greatly in its course; being slow in some cases, and rapid in others. The disease first shows itself by inflammation of the genital organs, and then attacks the joints, muscles, brain and spinal cord; causing lameness, paralysis and death. Paralysis of the loins is a frequent symptom.

The muscles lose their power and the bones become brittle. There are usually no sores on the genital organs. I believe I am right in saying that no chancre or sore heralds in the attack, as in human syphilis. When sores do appear, they seem to be consequences of the existing inflammation. The skin may be affected by hard, painful and itchy swellings. The glands of the flank may become enlarged and may suppurate. There is, of course, loss of condition.

Symptoms in the Mare.—The mare stands the attack worse than the horse. Usually about eight or nine days after the impure act of copulation, the mare apparently comes "in season"; the parts become swollen and inflamed; and there is a discharge, watery at first, which gets thicker in time from being mixed with mucus and sometimes with blood, and which runs on and soils the skin below. The lips of the part become swollen. Mr. W. L. Williams remarks that the vulva shows a marked tendency to gape, especially at its lowest point, due, doubtless, partly to a loss of power in the vulva itself; but mainly to the enlarged clitoris pushing the lips apart. This gaping gives the appearance of extreme age even to a young mare. Mr. Williams also notes that in a large proportion of cases there is a peculiar loss of pigment in the skin of the vulva, perinæum and anus; beginning usually in spots of variable size and shape, gradually enlarging and coalescing until these parts are one continuous white patch, with irregular border, or are dotted over with white spots. French writers speak of the brick-red and violet marbling of the vulvo-vaginal mucous membrane.

Symptoms in the Stallion.—The approach of the disease is much more insidious in the entire than in the mare. The first symptoms may come on and disappear for a more or less prolonged interval, only to be developed with increased strength; the animal being capable through the whole time of transmitting the disease. "Usually the first noticeable sign of disease is a well-marked peculiar swelling of the prepuce of an indolent, doughy nature, which may extend forward to and implicate the anterior part of the sheath, and backward to and including the scrotum, the skin being thickened, smooth and shining" (*Mr. Williams*). Generally the testicles are unusually pendant, and as a rule there is loss of power in the muscles which retract the penis, which consequently hangs far out of the sheath.

Diseased Changes in the Tissues.—Throughout the tissues of the body, a characteristic, yellowish deposit (or, more correctly speaking, a growth) of gummy material (very similar to the product of human syphilis) occurs, and the muscles, bones and joints become pale, soft and fragile.

Treatment seems of no use. Mercury has no good effect in this disease.

Preventive Measures.—Affected horses should be destroyed. Stallions suffering from this disease should be killed, or castrated. The operation of removing the testicles always aggravates this disease.

Horse-Pox.

The horse is subject to a rare form of variola, which is very similar in its nature to the small-pox of man, although its effects are mild, and, in themselves, entirely free from danger to the life of the animal. The small-pox of man appears capable of producing horse-pox in horses; and the lymph of horse-pox acts like that taken from the cow, in guarding persons from small-pox. A horse suffering from the disease in question, can undoubtedly communicate it to another by contact, although authorities are not agreed as to the possibility of the virus being carried by the air from one horse to another.

The fever preceding the eruption is often so slight that it does not attract attention. The pustules have the characteristic appearance of variola, in that they are depressed in the centre, and have a red circle round each of them. They are, usually, confined to the legs below the hock and knees, but may also appear on the shoulders, back, mouth, nostrils, and other parts. When the eruption is on the legs, it is, generally, confluent (running together), and resembles, to some extent, grease, from which it may be distinguished by its forming a crust of scabs that adhere, principally, by means of the hair. The sudden and transitory nature of the attack of horse-pox is very different from the gradual and lasting one of grease. The sores left after the scabs of horse-pox are, generally, very superficial; they heal rapidly, with little or no scar; and do not affect the lymphatics: conditions which distinguish this disease from glanders and farcy. The eruption may cause swelling of the legs, and inflammation to the membrane of the mouth.

The disease runs its course in about a month from the time that the animal receives the virus, until the scabs fall off. When the legs are much affected, they may continue swollen for a month or two longer.

I may remark that the term, variola, is applied to the general disease of which small-pox, horse-pox, and cow-pox seem to be varieties; and that a pustule is a small elevation of skin which contains pus (matter).

The *treatment* may consist in keeping the animal on green and laxative food ; and giving ½ oz. of nitre in the mash or water, every second day or so. If the mouth is sore, it may be washed out, from time to time, with a strong solution of borax or alum in water.

Diabetes Insipidus, Polyuria, or Profuse Staling

Is a disease characterised by a continued and excessive flow of watery urine of low specific gravity, and by consequent thirst. The conditions which give rise to this state, appear to have little or no connection with the well-being of the kidneys themselves. We know that irritation to a certain portion of the brain is accompanied by profuse staling, though we cannot exactly say how this is brought about. It is not improbable that disease germs which are contained in musty forage and which appear to give rise to Polyuria (*i.e.*, much urine), may, after being received into the circulation, irritate the nervous centre in question. In other cases, the fact of the blood being in an altered condition from disease, errors in diet, etc., may render it liable to encourage the development of ferments or other morbid material, the presence of which in the blood may also disturb the nerves that supply the vessels of the kidneys. Or, the agencies at work, whatever they may be, may effect their purpose by causing the watery portion of the blood to escape with undue rapidity from the arteries of the kidneys. The tendency to dropsy often met with in this disease, seems to favour the view that the fault, in some instances, may lie in the state of the blood itself.

This disease, as a rule, is of a mild type.

The form of diabetes observed in human practice, in which sugar is found in the urine, is almost unknown among horses.

Causes.—Improper forage, such as musty hay and corn; feeding on boiled food for a considerable time (*Williams*); debility; exposure. It may accompany indigestion and other disorders.

Symptoms.—Both the thirst and the amount staled are excessive. The urine is watery and of low specific gravity. Pulse weak. Rapid loss of condition. Coat rough. Gums pale. Breath sour-smelling. Appetite depraved, and, often, voracious. Bowels costive. Dung, usually, dark in colour and of a bad smell. Proneness to sweat after slight exertion. General debility. Sometimes, there are dropsical swellings.

Treatment.—Give a mild dose of physic; change the nature of the food; instead of water, give the animal a copious supply of linseed tea to drink; mix in the food 2 oz. of bicarbonate of soda daily. If these simple measures do not succeed, give daily in a ball, soon after feeding, 2 drachms of iodine for six or seven days, exercising judgment in diminishing the iodine as the thirst and amount staled decrease, and mix in the food or water, daily, 1 oz. of the hyposulphite of soda. Owing to the irritating effect of iodine, it should never be administered when the stomach is in an empty condition. The animal's drink should on no account be curtailed in this disease.

Dr. Evans, M.R.C.V.S., advocates the use of clay water, which is made by mixing yellow clay with water, and after the sediment has been deposited, giving the solution to the animal to drink, instead of plain water. The bicarbonate of soda, however, seems to act equally well, and is the cleaner and more manageable agent of the two

Iodine appears to act, here, as a powerful diffusible antiseptic in checking the development, in the blood, of morbid material; and, also, as an eliminative. Its almost specific (if I may use the term) action, in this disease, was first discovered by Professor Dick. The bicarbonate of soda and linseed act as sedatives. The hyposulphite of soda checks, to a marked degree, putrefactive changes in the blood; and, also, during constipation, neutralizes the foul gas given off by the residue of the food which is in the intestines.

Professor Robertson describes a dangerous form of diabetes insipidus, in which the urine is dark coloured, thick and of high specific gravity, owing to the presence of a peculiar form of albumen. There is rapid wasting, followed by paralysis and coma.

Excessive urination after diseases of the organs of breathing should not be interfered with; for it is an effort of nature to get rid of the effete matter which is taken up by the blood, on the products of the previous inflammation becoming broken up. The waste matter with which the blood is loaded, irritates the kidneys and gives rise to the profuse staling.

Purpura Hæmorrhagica

Appears to be a grave alteration of the blood due to the introduction into the system of some virus produced under bad sanitary conditions, or generated within the body during previous illness; or it may be caused by some constitutional taint or weakness. As a rule, it follows some debilitating disease, such as strangles, influenza or catarrh; in which cases, it appears during the stage of convalescence. It is neither infectious, nor can it be communicated by inoculation.

Nature of the Disease.—We may roughly say that the blood in purpura, is in a more or less decomposed state. The amount of albumen in it is greatly diminished; the red corpuscles are more or less shrivelled and broken up; and the watery constituents show a marked tendency to separate themselves, and, consequently, rapidly ooze through the walls of the blood vessels; thus, producing the characteristic swellings. The infiltration of this fluid into the brain, in excessive quantity, causes insensibility; and into the lungs, suffocation. The fluid which thus escapes, holds in solution a quantity of the colouring matter of the blood, which is obtained from the broken-up red corpuscles, and which causes the various infiltrated tissues to become stained: hence, the name purpura hæmorrhagica. The blood itself is darker than usual, owing to changes undergone by its colouring matter. It also, loses, to a marked extent, its property of coagulating.

Whether the blood only is affected, or whether the walls of the vessels are also implicated, are questions which our present state of knowledge does not enable us to answer with certainty.

Symptoms.—The first symptom is prominent swellings, which appear suddenly, and, usually, on the inside of the thighs, under part of the belly, sheath, breast, and about the mouth and nostrils. The swellings are hard, hot and painful to the touch, though not to a very marked degree. The amount of fever and increase of internal temperature vary much in individual cases, and during the course of the same attack. The pulse is very weak, and there is great debility. The bowels are, generally, constipated If, however, this is not the case, the dung is covered, more or less, with mucus and altered blood. The membrane lining the nostrils is redder than usual, and has distributed over its surface small purple blood-spots (*petechiæ*) which are somewhat similar in appearance to those caused by flea bites. These spots run together and the membrane becomes dark coloured. Its hue, however, may alter as the disease progresses. When the skin "is uncoloured, petechial spots are seen upon its surface, but where it is dark coloured no spots are discernible." (*Williams.*) The prominences on the legs soon run together, causing swellings of the limbs which terminate abruptly, as if tied by a cord, on the thighs and fore-arms. The lips and nostrils swell, the distension ending in the same sharp manner as it does on the extremities. The eyelids, also, usually swell. A thin, bloody discharge issues from the nostrils. The swelling of the head and throat often causes great distress in breathing; and a cough is frequently present in such cases. The horse can usually swallow fairly well. The swellings of the sheath, belly and breast generally terminate on the same level as those of the legs, they being due to gravitation of the exuded fluid. A dark coloured, irritating fluid oozes out from the swollen skin, tends to scald the parts over which it flows, and dries on it; thereby causing troublesome cracks, which chiefly appear in front of the hocks, and behind the knees and pasterns. Owing to the character of the blood, and, possibly, also to the condition of the vessels of the kidneys, the urine is darker than usual, its specific gravity is high, and it is in a more or less decomposed state.

It sometimes happens that portions of the swollen skin lose their vitality, slough, and leave sores that take a long time to heal.

Remissions in the symptoms are well marked in purpura. The swellings may subside and come on again in the same place or appear in some other part. While the patient is apparently doing well, all the dangerous symptoms may recur suddenly with renewed intensity; or the animal may die without warning.

The characteristic swellings and the blood spots are the distinguishing symptoms of this disease.

The horse begins to become semi-unconscious, as soon as the general swelling commences to appear, and he becomes more and more insensible to outward impressions as the attack advances.

Death occurs from gravitation of the watery fluid of the blood into the lungs and other organs; from the blood not being able to perform its functions; from blood-poisoning due to absorption of decomposing matter in the tissues; and from debility.

If the disease does not kill in a few days, it will, generally, run a somewhat chronic course, perhaps, up to six weeks; during which time, relapses not unfrequently occur.

Principles of Treatment.—Although the nature of this disease is, at present, but imperfectly understood; still, we are fairly warranted in directing our energies in removing the animal from unhealthy surroundings, and in trying to overcome the putrefactive tendency which the blood possesses in this disease; stimulating the walls of the vessels to remove the exudation; and supporting the vital powers. With these objects in view, we place the animal under the best possible sanitary conditions; keep up his strength by suitable food and drink; and give turpentine, which checks decomposition, causes contraction of the blood-vessels, excites the kidneys to remove the exuded fluid and other waste materials, and is a valuable stimulant.

Professor Williams strongly advocates the use of chlorate of potash in order to alter the unnaturally fluid condition of the blood, as the addition of this salt to blood greatly increases its power of coagulation. As ammonia is a product of the decomposition of blood in this disease, it should not be used here as a stimulant. The bowels should be kept open in order that the morbid products may be removed. The administration of the white of egg might be of benefit in increasing the amount of albumen in the blood. Nitre, with the view of reducing the swellings, should not be given, as it tends to increase the fluidity of the blood.

Treatment.—If the sanitary conditions of the stable be imperfect, remove at once, if possible, to a healthy, well-ventilated box. A change of stable would, in any case, be desirable. Give

Oil of turpentine . . .	½ oz.
Linseed oil	1¼ pints.

as a first dose, and then continue, if the symptoms indicate the necessity; giving ½ oz. doses of turpentine in ¼ pint of linseed oil, three times a day. Give 1 oz. chlorate of potash, daily, dissolved in the drinking water, of which there should be a plentiful supply. From the outset, the strength should be supported by gruel with eggs mixed in it. Also by ale or stout, if necessary. If the bowels act freely, the linseed oil may be discontinued, and the turpentine mixed with gruel and eggs as a drench. If constipation be present, administer enemas of warm water. Give green meat and any wholesome food the animal may like to eat. Keep him warmly clothed and nurse him carefully. If the breathing becomes difficult, tracheotomy may be performed, but only as a last resource; for the tissues, if wounded, have a great tendency to slough during this disease. For the same reason, the swellings should not be punctured unless with the object of relieving marked distress in breathing.

Scarlatina.

This disease has nothing in common with scarlet fever of man, except the appearance of blood spots (petechiæ, see page 412). Practically speaking, we may regard the scarlatina of the horse as a variety of purpura. In both, the causes, constitutional changes, non-infective character, and treatment, are the same. In purpura, the alterations in the blood, though apparently similar to those in scarlatina, are much graver. The following are the chief differences in the symptoms :—In scarlatina, instead of the diffused and abruptly terminating swellings met with in cases of purpura, there are distinct swellings or lumps, the elevation of which may be so slight that their presence might fail to be detected, were it not for the fact that the hair of the skin covering them stands on end. These lumps or patches exude a fluid resembling that contained in a blister. The blood spots which are found in the nostrils differ from those in purpura, in that they are of a scarlet instead of a purple colour. If the skin which covers the swellings or blotches, be white; blood spots, as in purpura, may be seen on it. The discharge from the nose is not dark coloured as in the other disease. In some cases, there are no swellings : the blood spots, however, are always present. Sore throat is, according to Professor Williams, an unfailing symptom, attended by cough and discharge of mucus. Sore throat does not often accompany purpura. Professor Williams considers that scarlatina appears usually as a sequel to influenza, and that in cases of recovery, it runs its course in not longer than nine or ten days, leaving the patient greatly enfeebled and emaciated; and that cases of scarlatina may degenerate into purpura, which is much the graver form of disease. Scarlatina is a mild affection, except when complicated by severe sore throat, or when the patient was in a state of debility before the attack.

Treatment. — Nurse carefully. Give chlorate of potash as in purpura. Regulate the bowels with linseed oil, enemas or Epsom salts in the water, according to the circumstances of the case. If his throat is sore, he should not be drenched. I may remark that some horses will refuse to drink water in which Epsom salts are dissolved. Steam the horse's head. Perform tracheotomy if necessary. Keep up the strength by judiciously chosen food and drink.

Azoturia

Is a condition of the system brought on by errors of feeding and management, and is chiefly characterised by violent spasms of the muscles of the hind-quarters and by the excretion of dark coloured urine, which contains a large amount of solid matter.

Nature and Causes.—It was first noticed by Mr. Haycock, and was called by him Hysteria; as he imagined it was peculiar to mares, and that it was due to excitement from sexual causes. Professor Williams, however, has pointed out that horses and geldings are also affected with it, and that it is owing to the presence in the blood of a large amount of deleterious matter which accumulates in that fluid, as a result of high feeding and want of exercise; and, thus, poisons the system. When this disease occurs, it almost always appears after exercise subsequent on a few days' rest. Muscular exertion seems, in this case, to be necessary for the development of the injurious substance which causes this special form of irritation to the nerves.

Local influences appear to have some connection with this disease, which, among horses kept under similar conditions, is very common in some places, and almost unknown in others. It has been remarked that horses which have been fed on hay or grass raised on land that has been manured with an excess of nitrate of soda, are specially prone to azoturia. Professor Robertson has made the same remark with regard to animals fed on large quantities of ripe tares, pease and beans, which are rich in nitrogenous matter.

Testing the Urine.—I may here remark that urea, which is found in comparatively large quantities in the urine during this disease, is the chief solid constituent of that fluid, and is the principal form in which the nitrogen of waste tissue is removed from the body. The presence of an unusually large amount of urea may be shown by adding nitric acid to some of the urine drawn off in a vessel, when a copious precipitate of nitrate of urea will be formed. There is also, generally, though not always, albumen in the urine during an attack of this disease. The acid will precipitate the albumen as well as the urea. The precipitate of the former is dissolvable in weak ammonia; but that of the latter will be unaffected by it.

Symptoms.—The seizure is sudden and, usually, appears when the horse has travelled a short distance after having been in the stable for a few days. The appearance of an animal suffering from this disease is characteristic; for without any visible cause, he looks as if he had severely injured his hind quarters or loins. He has a peculiar goose-rumped appearance, on account of the muscles over the quarters being violently contracted. One hind limb is generally advanced in front of its fellow, and, on attempting to put weight on it, the hind-quarters may drop until the hocks almost touch the ground. The animal is bathed in perspiration, and is in such agony that he will seize almost anything with his teeth, and, not unfrequently, will tear the affected side or his fore-arm. The urine is dark-coloured, and is usually copious, though the horse may be unable to void it. Sometimes, the symptoms are milder than those here described. On other occasions, the animal soon falls to the ground, and continues to struggle in a delirious, half-paralysed state, until it dies in a few hours.

This disease may be mistaken for cerebro-spinal fever, but differs from it (1) by the nature of the urine; (2) as regards the history of the case.

Treatment.—The proper treatment is removal of the cause; hence, give a full dose of aloes. Place the horse in a large, well-ventilated box, and give him plenty of water to drink. If he can stand in slings, put him in them; because, being very restless in this disease, he will, if allowed to lie down, knock himself about, and, by doing so, will greatly increase the fever and excitement. In some cases, however, he will be quite unable to support himself with his hind legs, and, consequently, would fall back in the slings, if they were employed. If the pulse be frequent and full, three or four quarts of blood may be taken away. Foment the loins and quarters with warm water, or apply a large hot bran poultice over the loins. Clothe the animal so as to encourage his skin to act.

The urine should be drawn off by means of a catheter from time to time, unless the horse urinates freely.

On the next and following days, give ounce doses of sweet spirits of nitre, mixed in cold water, three times a day. If there be subsequent constipation, give a pint and a half of linseed oil.

In this disease, symptoms should not be treated by giving astringents to change the dark colour of the urine. Counter irritants (mustard plasters or blisters) should, on no account, be applied to the loins or quarters; for the irritation caused by them would greatly augment the fever. The food, at first, should be light and laxative; but as there is great subsequent debility, the strength should, after the acute symptoms have passed off, be kept up by liberal feeding. A drachm of sulphate of iron may be then mixed through the food daily, and a couple of quarts of beer also given.

After a severe attack, the animal rarely recovers the full use of the affected limb. Deaths, in such cases, are more frequent than recoveries. If, in the first instance, the horse is unable to stand, we may regard his case as, practically, hopeless.

Weed, or Lymphangitis

Is a condition of the system characterised by inflammation of the lymphatic glands of one, or more, of the limbs.

The usual *causes* are over-feeding and neglect of regular exercise. These two are, generally, combined. Wounds of the feet sometimes give rise to a form of this complaint.

Nature of the Disease.—Besides the arteries, capillaries and veins, which are essentially concerned in the conveyance of blood, there is another system of vessels called the *lymphatics*, the function of which is to take up nutritive material from the intestinal canal, and, also, to remove waste products from the tissues. The lymphatics somewhat resemble the veins, as they are, at first, very minute, and, then, gradually, enlarge. In health, the superficial lymphatic vessels are not outwardly apparent to the eye ; but, when irritated, they become swollen and painful. In the hind leg, which is the usual seat of the disease, they follow the course of the great saphena vein that runs up the inside of the hock and thigh. Exercise quickens the circulation of the fluid (lymph), which flows through the lymphatics ; but want of work naturally tends to its retardation. When lymph stagnates—if I may use the term—in the lymphatics, especially, if the horse, for some time previously, has been fed on highly nutritious food, it is apt to cause irritation in the glands through which it passes. It is not improbable that, owing to its retention in these vessels, the lymph undergoes some unhealthy change. When an animal has been fed on highly nitrogenous food, the waste products of the tissues will be much more unstable in their composition than they would be were the percentage of nitrogen less. Again, we are aware that the circulation of both blood and lymph in the limbs of the horse—especially in the hind extremities—is peculiarly dependent on exercise. Hence, the probable reason for lymphangitis appearing in the extremities ; for its selecting the hind limbs in preference to the fore ones ; and for its being induced by idleness and high feeding. Why it should occasionally occur, as it is said to do, while an animal is in a starving condition, though doing no work at the time, is somewhat difficult of explanation. Perhaps the lymph, when no food has been given for some time, becomes abnormally rich in nitrogen. I can offer no explanation as to the preference exhibited by this disease, according to good authorities, for the near hind leg, rather than the off one.

Owing to the existing inflammation, a large quantity of fluid escapes from the vessels into the adjoining tissues, and gives rise to the swelling. This fluid has a strong tendency to become consolidated unless it is promptly removed by the lymphatics and smaller veins, whose power of doing so is held in abeyance as long as they remain inflamed. Hence, the advisability of reducing the inflammation as quickly as possible, and of endeavouring to prevent its recurrence.

This disease is, generally, confined to cart horses.

Symptoms.—The inflammation is usually limited to one bind leg, the near one, as a rule; although, in rare cases, both may become affected; or it may appear in a fore leg, the off fore, for choice, according to Professor Williams. The exceptional cases in which the disease occurs in front, are much milder than when in the hind extremities. There is great lameness. The attack is preceded by a shivering fit or cold stage; hence, the common designation "shake." The severity of the rigour is always proportionate to the duration of the attack. This stage, as in ague, is followed by a hot period, with high fever, frequent, hard and full pulse, and great pain of the affected part. The horse "blows," that is, he breathes as he would do after violent exercise. The glands at the groin, or at the elbow, as may occur in some few instances, swell. The swelling extends downwards, as far as the foot; but in farcy it extends upwards. There may be dropsical swellings about the sheath and under the belly. The hot stage is terminated by sweats breaking out over the body. When the swelling subsides, the inflamed lymphatic vessels of the leg appear clearly defined like enlarged veins; hence, the term "weed," from their supposed resemblance to a vegetable growth. As the complaint, generally, appears after a short period of idleness, it has, in some places, received the name of "Monday morning disease." As a rule, lymphangitis takes from one to two days to become developed; the severity of the symptoms remain unchanged for a like period, and then it slowly and gradually decreases, although the affected limb will, especially, after two or three attacks, rarely recover its original size.

This disease has a marked tendency to recur.

After repeated attacks, the limb becomes permanently enlarged—an incurable condition termed "elephantiasis."

Treatment.—At the first appearance of the disease, give a full dose of aloes, in ball or drench; and keep the animal on a short supply of food, allowing him only a little laxative diet, such as green grass, roots, and bran mashes. Bathing the part with warm water, and applying warm fomentations, are indicated by the fact that, as the swelling increases, the pain and lameness diminish. During the intervals in which the leg is not fomented, keep it smeared over with extract of belladonna, made up with gum to render it adhesive, or with a little glycerine. While the cold stage lasts, have the animal warmly clothed. Give, after the first day or two, an ounce of nitre in the food or water, daily, for a week. If the sheath be swollen, puncture it; for a distended condition of that part may prevent free urination. The affected leg should be neither blistered nor fired; though we may endeavour to reduce its size by hand-rubbing; by the pressure afforded by an elastic or flannel bandage; or by the application, from time to time, of the ointment or tincture of iodine. The horse should, on no account, be worked, or even taken out of his stall, until all inflammatory symptoms have subsided. After an attack, great care should be observed as to his feeding and exercise; for the disease has a strong tendency to recur, and, by doing so, to cause a permanent thickening of the limb.

If abscesses form, they should be freely opened with the knife.

Mr. Fred Smith advises that during the inflammatory stage, no time should be lost in freely scarifying the affected limb, and then bandaging it, so as to favour the escape of the lymph (the colourless portion of the blood), which is the cause of the swelling and of the subsequent enlargement of the leg.

Bleeding from the jugular vein in this disease, should on no account be resorted to; for, if practised, it will increase, to a high degree, the tendency of the affected limb to become chronically enlarged; although it may, apparently, for the time, be of benefit in alleviating the acute symptoms.

On account of its recurrent nature, a horse that has been known to have had this disease, should not be passed sound. The feeding and exercise of such an animal should be carefully regulated.

I may remark that it is quite useless to attempt to treat an old case of swelled leg which has been induced by attacks of this disease.

Rheumatism.

I venture to state, that acute rheumatism—which is an acute fever that is characterised by the presence of inflammation of a shifting nature, in joints and other fibrous tissues—is unknown in the horse. The only form which, we have reason to suppose, affects these animals, in some rare instances, is that which is similar to the local rheumatism of man, like *lumbago*, *sciatica*, and *stiff neck;* and is accompanied by little or no constitutional disturbance. This muscular rheumatism, as we may term it, seems to, specially, affect the fibrous tissue of muscles, and tendons. No change of structure in the affected tissues has been observed to occur on account of the presence of the affection, whatever its nature may be; although it seems hardly possible that some alteration does not take place. Muscular rheumatism is characterised by pain, which appears to be felt, only, when the affected parts are moved. When it is in a limb, it causes lameness, which "works" better. Parts suffering from it do not become hot or swollen; at least, to any marked extent. On the contrary, they waste away, if subjected to its influence for any length of time, probably, on account of the presence of pain preventing the animal from using them sufficiently, and, doubtless, also, by reason of the disease interfering with the nutrition of the part. It is possible that many cases of so-called *Kumree* in India are those of muscular rheumatism. The more frequent seats of this complaint are the loins and shoulders. It appears to be induced by chill, especially when the system is in a state prone to an attack: a condition which is well marked in men, although it can be rarely observed in horses, on account of these animals living under more healthy systems of food and drink, than we do. It seems probable that muscular rheumatism is due to the presence, in the blood, of some morbid material, which, under ordinary conditions of health, is freely excreted. If, however, excretion is checked by chill, for instance, the poison has a tendency to become localised, in some irritating form or the other, in some group of muscles. Hence, we should, in treating this complaint, encourage a laxative condition of the bowels, and free excretion from the skin. In the horse, bleak, damp weather is always favourable to an attack, which usually runs a chronic course; the symptoms being more pronounced at one time, than at another.

A verdict of rheumatism is not unfrequently used as a convenient "get out" by persons who, in certain cases, are unable to determine the cause of the lameness or pain, and do not wish to confess their ignorance.

Treatment.—Change of climate from a moist to a dryer one, is often found to act beneficially. The animal should be kept warm, secure from draughts, and should have plenty of green food, water, and rock salt. For physic, give nitre, or iodide of potassium. We may blister the seat of pain; rub into it kerosene oil in which as much camphor as it will take up, has been dissolved; or we may inject into it, two or three grains of acetate of morphia, daily, for a few days.

Melanosis

Is a malignant growth which occurs in various parts of the body. It appears in the form of dark coloured tumours, which gradually increase in size, and are, usually, situated on the lower, and, sometimes, on the upper surface of the tail, and about the anus, sheath and crest. When it affects the tail or crest, the hair over the seat of the disease falls out after a time. Melanosis is, with but few exceptions, confined to grey horses, and usually appears after the ninth or tenth year, when the coat begins to turn white. It is much more common in India than it is in England; perhaps, because the proportion of grey horses to those of a darker hue is much larger in the former, than it is in the latter country. The effect of light on the colouring granules of the pigment cells may also have something to say to the increase in the number of cases met with in the hotter climate.

When existing to any extent, melanosis is a disgusting disease. It is not alone an eyesore, but, also, from affecting the internal organs, it may permanently injure the horse's health, or even prove fatal to him. The animal's condition is, more or less, impaired by the irritation caused by the tumours, which will often, especially if subjected to friction, burst, and form unhealthy sores, which discharge a dark coloured fluid.

The *treatment* can be only palliative. Although the malignant growths may be cut or burned out, they will assuredly re-appear.

The term *malignancy*, is applied to growths which have the property, after being locally removed, of reproducing themselves at the same spot, or on some other part of the system. For instance, a wart is a benign growth; a cancer, a malignant one.

Rabies.

Definition.—Rabies is a contagious fever which is transmitted from one animal to another by inoculation.

Nature of the Disease.—The only special connection between rabies and the dog tribe is that dogs, wolves, foxes, and jackals are, by reason of their biting powers, particularly good disseminators of the virus, when they themselves are affected with it. Rabies is due to a specific disease germ, and cannot occur spontaneously. These germs are abundantly found in the rabid animal's saliva, which retains its virulent properties for some time after it has quitted the mouth. Hence, care should be taken to disinfect the stall, feeding-trough, bucket, etc., upon which this fluid may have fallen. The saliva of a rabid animal, in order to produce the disease, requires to come in contact with a broken surface of skin, or even of mucous membrane. All horses bitten by rabid dogs, which are almost always the source of the disease, do not necessarily go mad; for some successfully resist the contagion.

Period of Incubation is about from 15 to 40 days.

Chances of Recovery, when once the symptoms show themselves, are practically *nil*.

Duration of the Attack, from the first commencement of the symptoms, is from 2 to 4 days.

Symptoms.—The first symptom is extreme watchfulness and liability to be startled at the slightest noise or at the sight of any moving object. The temperature is high and the pulse frequent and strong. The animal gets seized with paroxysms of excitement, which increase in severity, while the intervals of rest get shorter as the attack continues. There is sometimes more or less paralysis of the hind quarters, and continued spasm (which becomes worse during the paroxysms) of the neck and throat, which renders the animal unable to drink water, although he may try to do so. This inability to drink is by no means a constant symptom; for some rabid horses will drink freely almost up to the last. In some cases, but not always, there is a copious discharge of saliva from the mouth and a hoarse cough. It has been frequently noticed that the horse will bite and tear at the spot which was bitten, if it be within reach. The animal becomes more and more excited, until he gets into a state of mad fury, falls down, becomes convulsed or insensible, and dies.

The symptom of all others to note in a suspected case, is the watchful, horrified, or "hunted" look with which a horse in the first stage of rabies will regard any one who goes near him. The moment this is observed, he should be secured so that he cannot injure himself or anyone else.

Preventive Measures.—If we can take the animal in hand shortly after the bite has been inflicted, we should freely cut away the part, or destroy it with the red-hot iron, nitric acid, or lunar caustic. If a Pasteur Institute be within reach, protective inoculation should be tried.

As *treatment* is of no avail once the symptoms have manifested themselves; the only thing to do is to shoot the affected horse.

CHAPTER XV.

DISEASES OF THE LIVER.

CONGESTION AND ACUTE INFLAMMATION OF THE LIVER—CHRONIC DISEASE OF THE LIVER.

Congestion and Acute Inflammation of the Liver.

As it is very difficult to distinguish the various diseases of the liver of the horse, one from another, in the living animal, and as they are rare in Europe, and have consequently been but little studied; I cannot see, with our present state of knowledge, the use of following human physicians in their minute divisions of these affections. I may remark that congestion is the first stage of inflammation of the liver, and that jaundice is but a symptom of derangement of that gland.

Many of the grave diseases of the liver to which men are subject, are, practically, unknown among horses.

Causes.—The usual causes are too high feeding, want of exercise, defective ventilation, residence in a damp, hot climate, and chill. In India, these affections are very common; as horses in that country are liable to general derangement of that organ during the hot weather; and acute attacks are frequent just after the rainy season, in localities where there is a considerable fall in the temperature of the air at night, as in places close to the hills. This tendency is increased by the practice pursued by many of the native grooms, who are, generally, but ill provided with garments, of removing the horse's clothing to use as their own bedding. It is easy then to conceive how the horse gets derangement of the liver; for the cold, acting on the surface of the body, contracts the superficial blood-vessels, and, thereby, drives the blood to the internal organs. It stands to reason that the organ which is in the worst state of health will be the first to suffer from a sudden rush of blood. Hence, we find that in cases of chill, the liver of the horse is particularly liable to disease in India; and that the lungs, pleuræ, or bronchial tubes are more prone to attack in the colder climate of Great Britain.

I have found that acute attacks of liver disease, in India, are comparatively frequent in places where there is a marked fall, at certain seasons of the year, in the temperature of the air at night; and that chronic disease of that organ is peculiarly rife in hot, damp climates like that of Bengal. Horses thrive well, under proper management, in hot climates so long as the atmosphere is dry; but the presence of an excess of moisture in it is prejudicial to the well-being of these animals. In fact, in many hot, damp climates, it is practically impossible to breed and rear horses capable of doing ordinary work.

Australian and English imported horses, in India, are much more liable to these affections than are Arabs and indigenous animals.

The practice, in India, of bathing in cold, instead of in hot water, is a fruitful source of liver disease among men; and acts in the same baneful manner as that of depriving horses of their clothing during cold nights which follow hot days.

Symptoms.—Yellowness of the gums and of the lining membrane of the eyelids; loss of condition; clay colour and offensive smell of the dung, which is sometimes mixed with coffee-coloured patches. Sour smell from the mouth; loss of appetite; constipation; urine high-coloured on account of the colouring matter of the bile being excreted along with it. There is dulness and depression, accompanied at first by some fever, which may be perceived from the increased frequency of the pulse and rise in the internal temperature of the body. The horse may evince, on pressure over the region of his liver (the right side), the presence of pain. In some few cases, there is lameness of the off fore-leg.

Nature of the Disease.—The liver is a large gland which weighs, in the average adult horse, about 11 lbs. Besides the arteries that go to it for its own nutrition, as well as their corresponding veins, the liver receives a large supply of blood from the portal vein, into which is poured the greater part of the blood that is received from the internal organs of digestion on its way back to the heart. The liver, therefore, has two systems of circulation: namely, one nutritive; the other functional. Following the teaching of Drs. Murchison and Bristowe, we may state in general terms, that the functions of the liver are: (1) To convert the starchy and saccharine matters which are absorbed into the blood from the food, into a substance called glycogen ($C_6H_{10}O_5$), which is formed and stored in the cells of the liver, whence it is removed in the form of grape sugar ($C_6H_{12}O_6H_2O$) into the general circulation; partly for the maintenance of the internal heat, in being converted into carbonic acid (CO_2), and water (H_2O), by its union with the inspired oxygen, which burns up the carbon; partly for the nourishment of the tissues;

and probably, for the formation of fat. (2) To convert albuminous matters (both waste and nutritive) in the blood, and, also, glycogen into products that can be easily eliminated from the system ; the waste material being finally excreted by the kidneys, in the form, chiefly, of urea and uric acid. I may remark that their undue retention in the blood, whether by the failure in action of the liver, or of the kidneys, gives rise to great depression, and, in extreme cases, to insensibility and death. (3) To maintain the internal temperature. (4) To form bile. As the vessels which supply the portal vein absorb nutritive matters from the food, it follows that, when an animal is too highly fed, its liver will be unduly taxed, with the result of more or less serious derangement. As the liver requires a large amount of oxygen for the purification of, and changes wrought in, the blood, the *want of air and exercise* is specially injurious to this organ. The rate of breathing, directly, effects the rapidity of the circulation of blood through the liver ; hence, a state of idleness will tend to induce congestion of this gland. The effect of a *hot atmosphere* is not alone to diminish the amount of air taken into the lungs—for the warmer the air, the more rarified will it be—but, also, to bring on destructive changes in the structure of the liver itself. The skin, which is peculiarly active in the horse, undoubtedly helps this organ in removing impurities from the blood ; hence, when the functions of the skin are checked by the presence of a large proportion of moisture in the air, the powers of the liver will be unduly strained. This fact appears to be one of the chief reasons that hot, damp climates are peculiarly unsuitable to horses. As exercise quickens the entire circulation, its absence will, naturally, render that of the liver torpid.

The liver is composed of a large number of lobules, which are about the size of millet-seeds, and in which *bile* is manufactured. This yellow fluid is carried from the lobules by bile-tubes, which unite, and finally form a common duct which discharges the bile and also the pancreatic juice into the small intestine, in order that they may mingle with the semi-prepared food (*chyme*) that has just quitted the stomach. The bile-tubes are lined with mucous membrane, which, in a state of health, constantly secretes mucus, to lubricate these passages. Surrounding this membrane, there is a coat of involuntary muscular fibre which urges, by its contraction, the bile and mucus forwards.

Bile acts as a natural purgative, and, also, as an antiseptic in checking decomposition of the food. Hence, when it is absent, the bowels become constipated, and the dung emits an offensive odour and assumes a clay colour on account of not being tinged by the colouring matter of the bile. When the bile is irregularly discharged, there are often coffee-coloured patches found in the dung; a fact which is owing to an altered condition of that secretion. Bile assists the pancreatic juice in forming an emulsion with the fat contained in the chyme. These two fluids being alkaline, a soap is formed, in which the oily particles are split up into a very fine state of division, which gives the chyme (now called *chyle*) its white appearance, in the same manner, as it does in the case of milk. The object of the minute division of fat is to facilitate its absorption. The fact of the mucous membrane of the intestines being moistened with bile quickens the absorption, through this coat, of fat contained in the food; hence, when the amount of bile, which is discharged into the intestine, is deficient in quantity, the animal will, in all likelihood, lose condition. Bile, also, aids in the absorption of albuminous matters.

Bile is composed of colouring matter and of bile acids; the latter being manufactured in the liver. It is probable that the yellow bile pigment is derived from the colouring matter of the red corpuscles of the blood, which are broken up in the liver during the passage of the blood through that organ.

When congestion of the liver occurs, its vessels become over-filled with blood, and as, at the outset of every case of inflammation, the function of the attacked organ is stimulated, an increased supply of bile is secreted. The liver now swells considerably; the bile tubes become blocked up, owing to the inflamed state of their mucous linings, and to the presence of the over-distended blood-vessels; and the whole gland becomes gorged with bile, of which little or none, as shown by the clay colour of the dung, is discharged. The bile, thus obstructed, is in part absorbed by the blood, and taken into the general circulation, so that the various tissues acquire the characteristic tinge of jaundice. The bile is finally excreted by the kidneys, and, to a small extent, by the skin.

Jaundice occurs in two ways: (1) when, as we have just seen, the bile is prevented from getting into the small intestine; (2) when there is no obstruction, but from some cause, such as an excessive secretion of bile especially when conjoined with constipation, this fluid, having gained access to the intestine, is not changed into new products, as it ought to be, but becomes absorbed into the blood, and, consequently, stains the skin and other tissues. (*Murchison.*)

The depression and debility experienced in jaundice have been generally attributed to the presence of bile in the blood. It is, however, more probable that they are due to the retention in the blood of various impurities, which the liver, when it is in a diseased state, is unable to transform, with sufficient quickness, into products that the kidneys can readily remove ; for we find that the injection of bile into the blood gives rise to no special symptoms of depression. The fact of the various tissues being stained with the colouring matter of bile does not, in all cases, imply the existence of weakness and debility.

Principles of Treatment.—To relieve the congestion of the vessels of the liver, and, also, to get rid of noxious materials contained in the blood, we may use a purgative, the effect of which will be to draw blood away from that organ to the intestines, and, also, to cause the evacuation from the blood of a quantity of its watery fluid, which holds the hurtful materials in solution. The aperient I would recommend is the sulphate of magnesia (Epsom Salts). Its action should be assisted by keeping the horse on laxative food, such as bran mashes, roots, and green fodder. Two or three enemas of warm water, in order to clear out the rectum, might be administered. As the kidneys and skin (to a lesser degree) are the organs which remove the bile that is absorbed into the blood, we may with advantage stimulate them. For this object, I would advise the use of nitre, which acts on the kidneys ; or of sweet spirits of nitre, which acts on the kidneys and skin, and is also a stimulant ; warm fomentations over the region of the liver (the right side) ; and warm clothing. To aid in overcoming the great debility, as well as to stimulate the kidneys and skin, the employment of sweet spirits of nitre is, I think, specially indicated. Care should be taken to allow the animal a plentiful supply of fresh water, in order to keep the blood in a sufficiently fluid condition. Moderate exercise and a full supply of fresh air are essential.

While we have thus endeavoured to reduce the congestion of the liver, to remove the bile which has been absorbed into the blood, and to overcome the constipation of the bowels, we have in ipecacuanha a valuable agent for relieving the obstruction to the flow of bile into the intestines; for restoring the gland to its healthy function; for mitigating the congestion; and for allaying the fever, by its sedative properties. It appears to act by stimulating involuntary muscular fibre, and thus relieves congestion of the blood-vessels of the liver by causing their muscular coats to contract; and in the same manner, the obstruction in the bile-ducts is relieved, and the secretion is allowed to flow into the intestine. The action of this drug, here, is very similar to that which it has in relieving the distressing symptoms of bronchitis in the human subject; for, when the mucous membrane of the bronchial tubes is dry and inflamed, it alleviates the congestion of the blood-vessels and causes a healthy secretion of mucus; and if the bronchial tubes are blocked up by mucus (phlegm) it stimulates their muscular coats to expel it. I am indebted to Mr. Kettlewell, V.S. Bengal Studs, for having directed my attention to the employment of ipecacuanha in the treatment of congestion and inflammation of the liver. I have used it in many cases of these affections, and always with marked success. Dr. J. Macpherson, late Inspector General of Hospitals, Bengal Army, speaks highly of its employment, in large doses, for inflammation of the liver in human practice.

Alkalies, such as the *bicarbonate of soda*, are very useful; for, according to Dr. Bence Jones, they greatly assist in the oxidation of the products of unused nutritive matter and of broken-up tissue in the blood, which products the liver is called upon to convert into substances of which the kidneys can speedily get rid.

Sal-ammoniac exercises a powerful influence in relieving the functional circulation of the liver. As the amount of nitrogenous solids in the urine increases largely after its use, we may surmise that it tends to restore to the liver its healthy function of purifying the blood by aiding in the formation of these products. It may be used in combination with alkalies or mineral acids. It is also a good stimulant.

Salts of Iron should not be given, as—probably, on account of their astringent properties—they, almost invariably, aggravate the disease. If a tonic be required, try nux vomica, gentian, or chiretta.

Practical Treatment.—Agreeably to the foregoing remarks we may give, on one or more occasions, as a drench—

Epsom salts	8 oz.
Water	3 pints.
Treacle	A sufficiency.

Give 2 drachms of ipecacuanha in a ball twice a day for a week. It may be discontinued sooner if the gums and insides of the eyelids recover their usual healthy hue before that time. Administer, as a drench, an ounce of sweet spirits of nitre in a pint of cold water, two or three times a day. The Epsom salts and sweet spirits of nitre may be given as the symptoms seem to indicate. An enema of warm water may be administered from time to time, if the constipation continues.

Apply warm fomentations over the liver (on the right side), keep the horse warmly clothed and stabled. Allow him bran mashes, roots, green fodder, and plenty of water to drink. A little gentle exercise—say, a walk for a mile or two, once or twice a day—may be given at discretion.

Two ounces of bicarbonate of soda mixed in the daily allowance of food, and half an ounce of sal-ammoniac in a pint of water, as a drench, three times a day, may be tried with advantage.

Chronic Inflammation of the Liver.

The same causes induce both chronic and acute inflammation of the liver. The former, generally, comes on after repeated attacks of the latter.

Nature of the Disease.—In *chronic inflammation of the liver*, there is a large increase in the amount of the fibrous tissue of that organ, which causes, by pressure, more or less obliteration of the bile cells (which are the secreting elements), and, also, hinders the circulation of blood through the liver, and consequently, gives rise, in some cases, to abdominal dropsy (ascites), which is due to the transudation of watery fluid from the blood contained in the portal vein and its tributaries. These vessels become greatly congested on account of the passage of blood supplied by them being obstructed. As a rule, in this disease, the liver shrinks to a good deal less than its natural size. It may, however, become enlarged, or may remain unaltered in bulk. Too high feeding, particularly in hot climates, may lead to fatty or other degeneration. All these changes will most materially impair the working efficiency of the liver. The proper treatment will naturally consist in feeding the horse on food which will have the least possible tendency to overtax his liver; and we may depend on bicarbonate of soda and sal-ammoniac as the safest and most efficient medicines. (Respecting their actions see pages 436 and 437.)

Symptoms and Treatment.—This disease is rather obscure in its nature. The cases which I have seen in India, presented but few characteristic symptoms to guide the observer. There was always depression of spirits; loss of appetite for corn, although the animal would eat plentifully of green meat of every sort; wasting of the muscles, which was very apparent over the hind-quarters; and the animal often became pot-bellied. The bowels were, generally, constipated; the dung lighter coloured than natural; and the gums and lining membrane of the eyelids pale, and tinged with yellow. The coat did not seem to become affected. I have found that, in these cases, the animal got considerably better on a course of green fodder, roots, and regular, though moderate exercise, and now and then a short course of bicarbonate of soda, or sal-ammoniac; but that, if he was restricted to "hard" food, he would rapidly lose the little condition he had "put on," and that the mucous membranes would become yellow, and the mouth would acquire a sour smell. I have rarely seen a radical cure effected in the case of a horse suffering from this disease in India.

The appropriate treatment would be green food, attention to ventilation, a free supply of fresh air, and moderate exercise. Two ounces of bicarbonate of soda may be given in the food daily, and half an ounce of sal-ammoniac in a pint of water three times a day. These medicines may be continued for a month, or longer.

A biniodide of mercury blister might be applied over the region of the liver, with the object of causing absorption.

CHAPTER XVI.

NERVOUS DISEASES.

PARALYSIS OF THE LOINS FROM KUMREE—PARALYSIS OF THE LOINS FROM SPINAL CONGESTION —TETANUS OR LOCKJAW—STRINGHALT—SHIVERING—PARALYSIS OF THE LIPS—MEGRIMS, STAGGERS, AND EPILEPSY—SUNSTROKE.

Paralysis of the Loins from Kumree.

THE horse is liable to suffer, especially in India, from paralysis of the loins which comes on as a disease in itself, and is unconnected with mechanical injury to the part. As a rule, there is very little constitutional disturbance. This paralysis appears under two forms: the one being gradual in its approach; the other, sudden. Although the two diseases are almost identical in their results, they appear to be entirely different in their nature, one from the other. As the paralysis which comes on without warning, is met with all over the world, being probably due to spinal congestion, and as the other seems to be peculiar to India (where it is known as *Kumree*), and, perhaps, Burmah; I shall reserve for the latter this term, Kumree, which being derived from the Persian word, *kumr*, the loins, means something affecting that part.

Localities in which Kumree is Prevalent.—Owing to the confusion which has existed in the minds of observers, between the paralysis caused by kumree and that due to spinal congestion, I find it difficult to specify the localities in which these affections are, respectively, rife. There is no doubt that kumree is frequently seen in Bengal and Behar. The paralysis of the loins, which is very common on the Malabar coast, and which is met with in other parts of the Indian Empire, in Burmah, the Mauritius, and also, I am informed, on the West Coast of Africa, is, I venture to say, due to spinal congestion, in the great majority of cases. I must confess that although I had formerly observed a large number of instances of paralysis of the loins, among horses, in various parts of India, I failed during a long residence in that country, to draw the distinction which more matured judgment now forces upon me. I may remark that kumree is specially prevalent in swampy districts which are liable to inundations. Mr. Meyrick, F.R.C.V.S., observes, with respect to this variety, that " the disease was very common amongst the Government brood mares at Buxar, where one of the late Bengal studs was situated, when I was in veterinary charge of it ten years ago. The country all round was inundated to a considerable extent during the months of July and August, the land gradually drying in September and October. The mares were kept by native farmers, who were bad horse-masters, and, frequently, fed them upon coarse indigestible kinds of grass cut from the bed of swamps."

Hereditary Predisposition.—I learn from the Bengal Stud Records that kumree is not transmitted by parents to their offspring. A stallion, therefore, if paralysed to but a slight extent, may be used to breed from. A mare similarly affected will rarely be able to bear the weight of the horse.

Causes.—I am strongly of opinion that kumree is caused by parasites which are taken in with the food or water, are absorbed into the blood, and are deposited in the brain or spinal cord. Evidently referring to this form of paralysis, Mr. Meyrick observes that it "is most common in districts which are swampy or subjected to inundations during the rainy season, and this fact increases the probability of its parasitic origin." The theory that a horse affected by "worm in the eye" will subsequently suffer from kumree has been frequently advanced in India. Experience, however, does not bear it out. We may safely say that there is no *necessary* connection between the two diseases; although it is quite possible that the presence of one of these minute worms in the brain or spinal cord might set up inflammation, which would assuredly cause pressure on the nerves and consequent paralysis. This theory of the origin of kumree is mere supposition, which is, however, to a certain extent, borne out by facts connected with its causes and mode of invasion. Taking for granted the parasitic nature of the disease, there is little doubt but that the worm would be brought to its resting place in the form of an egg, which would take some time to become hatched and developed, and would give rise to symptoms that would slowly and gradually manifest themselves.

Some observers consider that kumree is caused by the eating of ergotised grain, the action of which is specially manifested by impairment of the general health, and may be followed by grave derangements of the system—paralysis among the rest—a train of symptoms which does not suggest kumree. Dr. J. Irving, late of Allahabad, has suggested that this disease may be caused by the eating of *Lathyrus* *sativus* (Hind. *Kussaree dal*) which is sometimes used to adulterate gram. The continued consumption of this lentil causes a form of paralysis in man very similar to that of kumree in the horse. Mr. Fred. Smith fed a donkey on it for some months without effect.

As a *preventive measure*, in districts where kumree is known to appear, care should be taken that the grass is not cut from swampy or lately inundated lands, and that it is not washed in stagnant water—as is frequently done in India—before it is brought in. A full quantity of salt should be given with the food.

The lameness of kumree is characteristic of marked weakness in the hind-quarters. In the early stages, the animal will walk and trot fairly well, although with a certain loss of freedom in his hind action. He turns, however, with difficulty, from want of proper control over his hind legs. If forced to back, he will exhibit more or less inability to support his hind-quarters, or may even sit down on his haunches. Generally, the animal will be unable to bear the weight of a rider on his back, and may even crouch down if the loins are pressed upon by the hand. In confirmed cases, he "drags" his hind legs—usually one more than the other—fails to advance them with precision, and can progress but slowly; and, if backed, or even turned sharply, he is liable to fall down.

Symptoms of Kumree.—As a rule, the symptoms come on very gradually, and may take three or four months to be fully developed. At first, there is nothing to indicate the mischief beyond a trifling awkwardness in the animal's hind action, which, on being observed by persons well acquainted with the symptoms of kumree, might elicit the remark that the horse was beginning to "go in the loins;" although he might be still able to perform his accustomed work in a fairly efficient manner. We should, probably, then find that he would get gradually worse, until, after a few months, he would become quite useless.

Softening of the cord is the chief peculiar appearance observed after death.

Chances of Recovery.—I think that paralysis from spinal congestion is more likely to get well, other things being equal, than that from kumree. I have never heard of recovery after a severe case of either variety. A horse which has had a comparatively mild attack, may improve sufficiently for light-harness work, or may even, in exceptional instances, become all right again. If the symptoms do not mend, the probability is that the animal will gradually become worse, and die after some months. In both cases of paralysis of the loins, the chances are greatly against the patient.

Treatment of Kumree.—Blister or fire over the loins, and give nux vomica, as recommended on page 449. The compounds of iron, as observed by Mr. Meyrick, being poisonous to many of the lower forms of life; 2 drachms of sulphate of iron may be given in the food daily, as well as iodide of potassium, from time to time.

Paralysis of the Loins from Spinal Congestion.

There is but little doubt that the paralysis of the loins which is sudden in its attack and which is often met with in various parts of India, and other hot countries (see page 442), and also, though less frequently, in temperate ones, is due to congestion of the spinal cord. In the East, it is common in places which have a damp, warm climate, and which are subject, at times, to cold dry winds, especially, east winds, if in the interior; or "land winds," if on the sea-coast.

This paralysis is sometimes met with in Cambridgeshire—where I have seen cases of it—and other fen counties. It comes on suddenly; appears to be accompanied by very little constitutional disturbance; and runs a more or less chronic course. Chill seems to be the usual cause of this complaint, to alleviate which, treatment appears to be but of little avail.

Breeds of Horses which are most subject to this Paralysis in India.—Arab and Australian horses are peculiarly liable to spinal congestion. As they are the only horses which are imported in any numbers to that country, we may reasonably conclude that any other foreign animals would be equally susceptible. Indigenous ponies, and, to a lesser extent, indigenous horses, enjoy a comparative immunity. My experience is that Arab stallions are much more liable to get this disease than are other kinds of horses. With very few exceptions, the Arabs which are imported into India and other countries, are entire; while geldings predominate to an equal extent among the Colonial importations. The proneness of Arab entire horses to this complaint is usually attributed to the fact that a large number of them contract the habit of masturbation, and thereby weaken themselves. I have observed that Arab race-horses, which are properly looked after, rarely contract kumree.

Symptoms of Spinal Congestion.—The symptoms become developed without warning. Often the horse is found, on the groom coming into the stable the first thing in the morning, to be more or less paralysed in his hind-quarters. Or, after having carried his master in the early morning with all his wonted power and dash, he may be discovered, similarly affected, after having been left for a few hours in his stall, where, it is probable, he has received a chill after work. In some cases, the attack is so severe that the animal is unable to stand from the commencement, and dies in a few days from exhaustion, brought on by excitement and other nervous derangement. Generally speaking, as long as the animal is able to keep on his legs, he shows but little signs of constitutional disturbance. Sometimes, the attack is so mild, that the horse continues capable of being ridden and driven, although he will exhibit a certain loss of power in bearing weight, and, also, in bringing his hind legs forward.

I may observe that the lameness from spinal congestion closely resembles that from kumree (see page 444).

If the animal does not die from the severity of the attack, the disease will, generally, run a chronic course, and the horse may slightly improve with time; may get comparatively well; or may become gradually worse, and die after a few months.

Causes.—There seems to be but little doubt that this paralysis is caused by chill, and is due to congestion of the spinal cord, on account of which there is an exudation of watery fluid from the blood-vessels into the spinal canal, with consequent paralysis from pressure on the cord. The all but universal idea in India is that this paralysis is caused by the influence of cold winds; hence, its common designation, "a stroke of the wind." It is a well-established fact that in places where spinal congestion is rife, cases are especially liable to occur when a cold, dry, night wind has sprung up after a sultry day. "Mr. Hallen, Inspecting Veterinary Surgeon of the Bombay Army, has stated that in one instance he stopped its recurrence in a native cavalry regiment, where it had been prevalent, by building a wall high enough to shelter the horses from wind." (*Meyrick.*) The baneful effects of chill, particularly in warm climates, are far greater when the air is laden with moisture, than when it is dry; because, under the former condition, evaporation from the skin is checked, while sweat bedews the body, and the superficial vessels become congested. If, when in this state, the animal be exposed to a cold, dry wind, there will be contraction of the blood-vessels of the surface of the body, with a corresponding rush of blood to the underlying tissues, which determination of blood may cause congestion of the vessels of the spinal cord, with consequent paralysis. The effect of the direct and powerful rays of the sun may, probably, predispose the cord to become thus affected, or may even bring about degenerative changes in that nerve centre.

Post-mortem Appearances.—I may briefly say that the appearances of recent cases of this disease are those of congestion of the cord at the loins, with, consequently, a large amount of serum (over 12 oz. in one case, according to Mr. F. Smith) in the spinal canal. Observers are generally agreed that in old cases—no distinction being made between it and kumree—there is always softening of the cord at that part.

Treatment of Spinal Congestion.—Give, in the first instance, a dose of aloes. Blister along the spine, over the loins, with biniodide of mercury (1 to 4); and mix ½ oz. of iodide of potassium in the food or water daily for a fortnight or so. Keep the animal warmly clothed and stabled, and give green food. If the patient can stand fairly well, slings may be of use; for it is quite possible that the local congestion might be increased by lying down. If the paralysis be considerable, slings should not be employed; as the consequent pressure on the abdomen would interfere with digestion. If the animal is unable to stretch himself out in order to urinate, the catheter should be passed four or five times a day.

The action of the purgative is to determine blood to the intestines, and, consequently, to draw it away from the congested part; while, by diminishing the amount of watery fluid in the blood, it hastens the absorption of the exuded serum. The effect of the counter-irritant on the skin is, probably, to cause contraction of the congested vessels, and, consequently, to relieve the unhealthy condition in which they are. As contraction of the superficial vessels was the original cause of the congestion of the vessels of the cord, it is reasonable to conclude that dilation of the former will be followed by more or less contraction of the latter. The action of the iodide of potassium is to cause absorption of the serum.

A fortnight or so after the commencement of the attack, we may consider that the inflammatory stage has passed, and we may then limit our treatment to giving a drachm of nux vomica morning and evening in the food, and to repeating the blister. As a last resource, the horse may be fired along the spine over the loins. The nux vomica should be discontinued as soon as nervous twitchings make their appearance in the muscles of the animal, or when his appetite begins to fail. I believe that the French veterinary surgeons in the island of Mauritius, recommend that a horse should be docked immediately after an attack of this disease.

Preventive Measures.—The horse should be warmly clothed, according to the season of the year, at night, and at other times when the temperature of the atmosphere is liable to fall. Precautions should be taken to prevent the animal getting chilled, especially after work. His body should not be washed. It is a good plan, in tropical climates, when the horse is picketed n the open, to protect his spinal cord from the direct rays of the sun, or from chill, by placing a folded blanket over his back and loins. The horse should have the protection of a wall between him and the quarter from which cold winds may be expected to blow. I need hardly say that these precautions are necessary only in places where the disease is common.

Tetanus, or Lockjaw

Is continued contraction of the voluntary muscles. It may come on after, or be unaccompanied by, a wound. Possibly in the latter case there is some unobserved abrasion; as when a horse gets tetanus after eating sand. In the former case, it is called traumatic; in the latter, idiopathic tetanus. Traumatic tetanus is, as a rule, the more dangerous of the two.

Tetanus appears to be caused by the entrance into the system of a specific disease germ (the *bacillus spilliformis* of Nicolaier), which is met with near the seat of the injury, but which is hardly ever found throughout the body, during the early stages of the attack, and very seldom indeed later on. The spasms seem to be due, not to the presence of these germs, but to some poisonous material formed by them. The presence of air (or rather oxygen) is unfavourable to the development of these germs, which consequently give rise to the disease more often in cases of punctured wounds, than in those of more open ones.

It is probable that when tetanus follows surgical operations, it is usually caused by inoculation from infected instruments.

There is some evidence to prove that it is an infectious disease.

When it occurs, it does so, generally, after castration, docking, broken knees, and deep wounds in the limbs, and punctures of the sole or frog of the foot. In some districts, as in and around Edinburgh and Cambridge, it is very common; while in other places, it is almost unknown. It is, probably, more common in the tropics than in temperate climates.

Tetanus is a very fatal disease, which may run its course in from three days to six weeks. "There are some cases of tetanus so acute from their commencement that it is quite hopeless to expect any but a fatal termination; and in every case where all the symptoms are firmly established before the fourth day of attack, death may be expected. But in cases where the symptoms are slowly developed, some movement of the jaws still remaining, the exacerbations not very severe—more especially if the animal possess a calm quiet temper, and lives over the ninth day,—a recovery may be expected." (*Williams.*)

Symptoms.—In cases accompanied by wound, the attack generally comes on just as the wound is beginning to heal. The muscles that are usually first affected by the continued spasm, are those of expression, which give the face a pinched or drawn appearance. The other muscles of the head and those of the neck soon follow. Hence, we have the mouth closed, the nose poked out, the head elevated, and the neck "ewed" (from contraction of the *levator humeri*). The muscles of breathing and those of the limbs become contracted; so that the back is hollowed and the tail raised, and the horse stands with out-stretched limbs. He shows great stiffness and rigidity in attempted movement. The eyes are sunk, and, during excitement, as when a person startles the horse, the haws are quickly protruded and then withdrawn. The animal looks nervous and terrified. The nostrils are dilated, the breathing quickened, and the flanks tucked up and heaving, which symptoms are due to the fact of the muscles of the chest becoming fixed, so that breathing has to be carried on almost entirely by the action of the diaphragm. As this abdominal breathing can be maintained for only a short time, we generally find that cases of tetanus which are rapidly fatal, are those in which spasm of the muscles of the chest is a prominent feature. Death may also quickly occur from continued spasm of the muscles of the larynx (see page 265.) The symptoms generally come on gradually. Although there is continued cramp of the muscles; still the patient suffers from aggravated spasms from time to time, the slightest noise or excitement being often sufficient to bring them on. The bowels are constipated, and there is often retention of urine, from the horse being unable to stretch himself out. In very mild cases the animal may be able to lie down. As a rule, the patient preserves his desire for food and drink; but is unable to gratify it, except to a very limited extent, owing to the rigidity of his chewing and swallowing muscles.

Treatment.—Place the animal in slings as soon as possible. "I recommend the slings because many horses which are in a fair way of recovery lie or fall down when the muscles begin to relax, and when down, struggle and fight to such an extent that they seldom recover from the excitement and renewed severity of the disease thus brought on. The surroundings of the patient are of the utmost importance; the stable must be darkened; should contain no other horses; be situated in a quiet spot, removed from noises, and the door must have a lock, the key of which is to be kept by one individual (the veterinary surgeon, if possible), who is to visit the patient, at most twice a day, and great care must be taken that the animal is not tormented by flies." (*Williams.*) The most successful medicinal treatment appears to consist in giving four drachms of extract of belladonna during the day, as a sedative, in a mash or placed between the animal's back teeth and allowed to gradually dissolve. Subsequently, the belladonna may be given as the symptoms may indicate. He should have a plentiful supply of nutritious gruel, milk and eggs, etc. In human practice, immense doses of chloral hydrate, to induce sleep, often act well. Owing to the long continuance of this disease, medicines are of little use, perfect quietude being the chief consideration. To obtain this, besides having a quiet, dark stall, we may (as has been recommended in human practice) block up the horse's ears with wax; so that he may be saved, as much as possible, from being startled by unpreventable noises. If a wound has been the exciting cause, apply warm fomentations to it. Re-docking or re-cutting the cord (after castration) is bad practice in tetanus.

If the jaws are closed, we may give subcutaneous injections of atropia. The belladonna or atropia should be administered only to modify the paroxysms, and on no account regularly. They generally have a laxative effect, owing to their stimulating the sympathetic system. A purgative should not be given, as it increases the number and violence of the convulsions.

Although the administration of calabar bean or chloroform has a marked good effect, for the time being, on horses suffering from tetanus, its after effect is to greatly aggravate the disease. If belladonna and atropia fail in alleviating the symptoms, we might try bromide of potassium, say, 1 oz. daily in the drinking water.

If the attack has been brought on by puncture of the foot, as, for instance, by a gathered nail, I would be inclined, at the very first appearance of the symptoms, to divide the nerves of the foot at each side, just above the fetlock as in neurotomy (see page 560).

Stringhalt

Is a convulsive spasm of the muscles which bend the leg; the foot being picked up with a peculiar snatch. In mild cases, it may be observable only when the horse begins to move, or, from time to time, as he progresses; but in bad cases, it may be perceived at every step he takes. It is almost always confined to the hind legs, sometimes affecting both of them. This disease almost invariably gets worse with age. I think slight cases of stringhalt are more readily seen in the horse's stall, on turning him round from side to side, than when he is taken outside. The causes of this complaint are obscure; though they are undoubtedly due to pressure on the nerves which supply the affected limbs. It is generally regarded as incurable; although, if aggravated by hard work or by injury, the symptoms may be relieved by the usual means, such as rest, physic, warm fomentations, etc. Several cases of stringhalt have been successfully treated by operation on the Continent. It is a grave unsoundness, the presence of which greatly increases the danger in case of injury to a limb affected with it; as the leg is in a state of unnaturally high sensibility. Hence, in such cases, slings are of special use in order to give rest. It is very common among cart-horses in Edinburgh ; probably, on account of the severe strain thrown on the hind legs when ascending and descending the steep inclines which are to be found in that city.

Shivering

Is a form of St. Vitus's Dance in the horse, and is manifested by irregular and involuntary movements of the muscles, generally, of the hind quarters. It, usually occurs if the affected animal be startled or made to move, especially when reined back or turned. "In many cases, the tail is spasmodically elevated and depressed in the manner of a pump handle, and the limbs elevated from the ground by a peculiar rigid or stiff movement ; the foot often suspended for a moment, as if the animal were unable to direct the action of the muscles." (*Williams.*) "In many instances, the characteristic twichings of the muscles of the loins, thighs, and of the erector muscles of the tail are markedly visible when the animal is engaged in the act of drinking." (*Robertson.*) In some rare cases, these spasms appear in the fore limbs and neck.

Shivering is, probably, a symptom of brain disease ; and is a serious form of unsoundness, for the alleviation of which, treatment seems to be of little, or no avail.

Paralysis of the Lips.

The nerves (the seventh pair) which supply the lips with power of movement, on leaving the brain, respectively, issue through the canal of the internal ear, and gain the outside of the cheek just below the joint of the jaw (see Fig. 20). They, then, pass, one on each side, along the cheek, close under the skin, to the lips. From their superficial position, they, not unfrequently, become injured by the use of heavy and ill-fitting bridles; the result being paralysis from pressure. When the nerve on one side only is affected, the lip will be drawn away from that side, owing to the paralysed muscles not being able to oppose the action of those of the healthy side. If both nerves be implicated, the lips will hang loose and motionless; and saliva will continually trickle from the lower one. As the sufferer has lost the power of prehension with his lips, he will seize his food with his teeth, and bury his mouth in the water he wishes to drink.

The *treatment* may consist in removal of all pressure from the part; warm fomentations; and, subsequently, biniodide of mercury blisters, below the root of the ear, and, partly, down the cheek; a dose of aloes; and soft and laxative food, given out of a bucket, so that the animal may readily eat it. ½ oz. of iodide of potassium may be given daily in the drinking water, or in a mash. The action of this salt is to cause absorption of any exudation which may result from inflammation, and which may be the cause of pressure on the nerves of the part. This disease is generally curable, especially if taken in time.

Megrims, Staggers, and Epilepsy.

The affection called in stable language, megrims, or staggers, somewhat resembles apoplexy in its mode of invasion, and may be due to many causes, among which, pressure of the collar, in giving rise to congestion of the brain, appears to be the chief. "There is the certainty that animals which have been subject to attacks of megrims when working in the ordinary collars have enjoyed perfect immunity from such seizures, when worked with a strap or band across the breast. This is a fact recognised not in this country only, but wherever horses are employed for draught." (*Robertson.*) The inference to be drawn is obvious. In some instances, the attack is due to brain disease, in which case it will, more or less, resemble epilepsy. The term megrims, in human medicine, signifies a form of headache which comes on in paroxysms.

Symptoms.—The attack commences suddenly. The horse throws his head about; stops, if previously in movement; staggers, and even falls. There is marked fulness of blood in the head; quickened breathing; and, often, convulsions.

The *treatment* is self-suggestive—if the seizure be brought on by the pressure of the collar—to remove the offending gear; and to "cool" the animal down, with laxative food, and a mild dose of physic, if necessary. The case hardly admits of treatment, if the complaint be due to nervous disease; for, in the horse, we require, at least, "practical soundness," and not mere prolongment of life, as may occur in human practice. Even for stud purposes, an animal afflicted with brain disease, would scarcely be worth keeping; considering the marked influence of heredity in these complaints.

Sunstroke.

Definition.—A more or less prostrated condition brought on by exposure to great heat.

Varieties.—(1) Heat exhaustion; (2) Heat shock, *coup de soleil,* or sunstroke proper; (3) Heat fever, or heat apoplexy.

The large majority of cases of sunstroke which I have seen have been those of heat shock; instances of the other two forms having been equally rare.

Symptoms of Heat Exhaustion. — The animal "blows;" hangs his head; is very depressed; gets gradually more and more prostrated until he lies down without power to get up. There is not the sudden climax like in the other two forms. There are no marked head symptoms, and the skin is not very hot. The horse dies from failure of the action of the heart.

Causes of Heat Exhaustion.—Over-exertion in hot weather.

Treatment of Heat Exhaustion.—Dash cold water over the patient. If in the sun, try and put him in the shade. Give him plenty of air. Fan him. Give him a liberal amount of spirits (say ½ pint) in water two or three times. Hand-rub him, so as to stimulate the superficial circulation.

Nature of Heat Shock.—The exposure to great heat, often aided by intense glare, appears to paralyse the nerve centres of breathing and of blood circulation by sudden shock, so that the lungs and heart are unable to perform their functions.

Symptoms of Heat Shock.—Cases of heat shock, as a rule, first show symptoms of heat exhaustion. The history is, generally, somewhat as follows:—The horse, who previously had been dull and breathing quickly (with, of course, distended nostrils), is taken out to work, which he does fairly well (although an experienced person would observe that he was much more distressed than he ought to be), suddenly, with hardly any warning of such an abrupt catastrophe, totters, his legs give way under him, and he falls down in an insensible condition. He may then struggle convulsively, get up and throw himself down in a most dangerous manner; or, while lying on the ground, he may make frantic efforts to get up, which he is unable to do owing to his being paralysed behind, and will madly dash his head about. This paralysis of the hind quarters is a marked symptom of sunstroke in the horse. Others will remain lying down, as if dead; these are the hopeful cases. In all such instances the animal is unconscious of external impressions, which fact will serve to distinguish this disease from azoturia. The temperature is high. The eyes are staring, but they evidently do not see, and their surface may be touched by the finger without causing the patient to wince little, if anything, from the contact. Apparently, head symptoms predominate. The breathing is shallow and greatly quickened, and in bad cases the pulse is so frequent and weak that it is all but imperceptible. The skin may be dry, or partially covered with perspiration. In severe cases the muscles over the whole surface of the body will often be in a state of continued tremor. If the disease runs a fatal course, it will usually do so within about six hours. Some horses apparently get all right after an attack of sunstroke, but begin to blow again in a few hours: these generally die from congestion of the lungs. When a horse which has fallen down from sunstroke gets up, we may regard him as being convalescent.

Horses that drop from sunstroke generally do so after 2 or 3 o'clock in the afternoon.

Treatment of Heat Shock.—Place the horse in the shade, and in some well-ventilated position; direct a stream of water from a hose (or water-skin in Eastern countries) over his head and also over his body, and place a bag of crushed ice to the head. These applications should be stopped the moment the temperature approaches its natural standard (see page 575). Then dry the horse, and use plenty of friction to the surface of his body.

If he can swallow, give him half-a-pint of spirits in a quart of water. If he be on the ground, put on hobbles, so that he cannot rise; and put plenty of straw under him, so that he cannot hurt himself. He should be kept lying down until he has recovered consciousness. It is well to rub over the loins or back some stimulating application (to draw the blood away from the head), such as one part of strong liquor ammonia to four of oil; or equal parts of turpentine, ammonia (dilute), and oil.

Nature of Heat Apoplexy.—We have reason to believe that the temperature of the body is regulated by a heat centre in the nervous system. As it is a property of nerves to become insensible to stimulus if they be excessively excited for a prolonged period, we may account for the sudden rise in temperature, and consequent climax in cases of heat apoplexy, by supposing that great and continued heat had so over-stimulated the heat centre that it had at last lost its power of control, with the result that the temperature rises to such an extent as to arrest the action of the lungs and heart. I have seen cases of heat apoplexy come on from horses travelling by rail in very hot weather.

Symptoms of Heat Apoplexy.—This comparatively rare form of sunstroke is as likely to come on in the stable as outside. The animal, probably for several hours previously, shows symptoms of high fever. The temperature of his whole body is very high, and his breathing is distressed. He falls down in a state of unconsciousness and delirium somewhat similar to that of heat shock.

Treatment of Heat Apoplexy.—Treat as for heat shock, but specially endeavour to reduce the temperature. With this object in view we may give enemas of iced or cold water in which antipyrin or bicarbonate of soda (say 4 oz. at a time) may be dissolved. Keep ice to the head, and watch the temperature.

Predisposing Causes of Sunstroke.—Keeping the animal in an ill-ventilated or crowded stable, and in one the roof of which does not afford adequate protection against the direct rays of the sun ; allowing him too little water to drink ; giving too much corn, and not a sufficiency of green food.

Climate.—The climate which is peculiarly favourable to the development of sunstroke, is a very hot one which has a sufficiency of moisture in it to check the cooling influence on the body of the evaporation of perspiration. The glare of the sun off buildings and roads naturally helps to bring on an attack. Sunstroke is very common during the hot weather in Calcutta.

Breed and Temperament.—The horses most predisposed to sunstroke are under-bred animals which have but little Eastern blood in their veins. As regards individual cases, horses that perspire little are peculiarly subject to it. Excitable, hard-pulling horses will naturally be more liable to suffer from heat exhaustion than more placid ones.

After-Effects.—Horses that have once had sunstroke, "stand the sun" badly, and are particularly liable to get another attack. They should, consequently, not be put to work during the extreme heat of the day in hot weather. In a few cases the paralysis of the acute attack permanently remains in a more or less pronounced form.

Preventive Measures.—The predisposing causes should be guarded against. Before taking a horse out to work, in a climate and during hot weather in which sunstroke is liable to occur, his breathing and general state should be observed. If he be seen to "blow," he should be put back, and should be treated accordingly. On a journey, under similar conditions, any unusually quickened breathing and unwonted depression should at once be attended to. In such instances the clinical thermometer (see page 575) will be very useful. A rise of say 3° F. will point to the existence of serious danger. Horses that have got to work in the sun, like those on tramways, should have short stages, and should be watered immediately after doing their turn. Probably the best mechanical protection to animals at work in the sun is a thick shade to the eyes; for there is no doubt that the effect of intense glare on the retinæ of the eyes is a potent aid in bringing on an attack of sunstroke. In our own selves we may experience the great relief and actually cooling effect of blue, green, or neutral-tinted glasses when worn in the open on a very hot and sunshiny day. I may mention that the retina, which is an expansion of the optic nerve, and which is very close to the brain, is peculiarly sensitive to heat rays as well as light rays. When horses are seen, by the fact of their "blowing" and being out of spirits, to bear hot weather badly, special precautions should be taken with them. I may mention that they will usually have an unusually hot skin, and will perspire with difficulty. They should have a plentiful supply of salt, and may, from time to time, get an ounce of bicarbonate of soda (baking soda) in their water every day for a week or ten days. They may also be washed daily with a strong solution of carbonate of soda (washing soda).

CHAPTER XVII.

POISONING IN HORSES.

In writing this chapter the following books have been chiefly consulted: Murrell's *What to do in Cases of Poisoning*, Finlay Dun's *Veterinary Medicines*, and Whitla's *Pharmacy*.

Only the most usual poisons which are given to the horse, maliciously or by misadventure, will be considered.

In all cases, no time should be lost in applying the available remedies; for, here, time is all-important.

Acids (Mineral).

Under this heading are included those extremely corrosive poisons, nitric acid, sulphuric acid, and hydrochloric acid.

Symptoms.—Great abdominal pain; mucous membrane of mouth inflamed and swollen, and probably stained by yellow, brown, or black patches. In cases of poisoning by nitric or hydrochloric acid, the breath may have the characteristic odour of the particular acid. Great depression; pulse small, rapid, and in bad cases irregular; violent thirst with great difficulty (or total inability) in swallowing. There is often difficulty in breathing. The patient may die quickly, or may succumb after several days or weeks from ulceration or perforation of the stomach or intestines.

Treatment.—Give large draughts of soap (say, a couple of pounds of yellow or unmedicated toilet) and water; a solution of baking soda (say 2 lbs.) and a gallon of water; fluid magnesia, of which a quart or more may be given; chalk and water; washing soda (which is not as suitable as the bicarbonate); plaster scraped off walls and mixed with water; linseed, olive and other sweet oil (say two or three quarts); 5 lbs. or 6 lbs. of butter or, in India, *ghi*; milk, gruel, or even large quantities of plain water. Perform tracheotomy if necessary.

About 5 grains of morphine hydrochlorate, dissolved in water, may be injected hypodermically, to allay the pain and to ward off the effects of shock.

Aconite.

Messrs. Creswell, in their *Diseases and Disorders of the Horse*, state that "many quack nostrums and some formulæ in the possession of stablemen and others contain overdoses of tincture of aconite," which, consequently, is a common cause of poisoning in horses. I may mention that Fleming's tincture is six times as strong as that of the British Pharmacopœia. Mr. Finlay Dun cites the case of an old cab horse, whom it was intended to destroy, getting two drachms and a third of Fleming's tincture, and recovering, although he very nearly died. The usual dose is 7 or 8 drops.

Symptoms.—Marked nausea, with attempts at vomiting; discharge of froth from the mouth, and sometimes sounds of gurgling in the throat; pulse very weak and irregular; breathing shallow and slow; great depression; body usually covered with perspiration.

Treatment.—Give large doses of spirits and water. Hand rub the animal all over, so as to stimulate the circulation. Give a hypodermic injection of 40 minims of liquor atropinæ sulphatis. If the pulse improves, repeat the atropine.

Aloes.

Probably more horses are killed by the injudicious administration of aloes than by any other poison.

Symptoms are those of superpurgation, with great weakness, depression, abdominal pain, and flatulence.

Treatment will be the same as for superpurgation (see page 322).

Ammonia.

Liniments containing ammonia are sometimes given by mistake as a draught to a horse. Hertwig found that one ounce of strong liquor ammonia, which is three times as potent as the ordinary liquor ammonia, caused death to the horse.

Symptoms.—Great pain; inflammation of the mucous membrane of the mouth; extreme difficulty in breathing; choking cough; slow pulse.

We may detect the smell of ammonia from the breath. If a glass rod which has been dipped in hydrochloric acid be held near to the horse's nostrils, white fumes will be given off.

Treatment.—Give half-a-pint of vinegar in a quart of water. This may be repeated if required. If vinegar be not at hand, substitute lemon or lime juice, or give double or treble the amount of orange juice. If the animal cannot swallow, make him inhale acetic acid (for preference) or vinegar from a handkerchief or sponge. Tracheotomy should be performed if the difficulty of breathing demands it. Inject hypodermically 5 grains of morphine hydrochlorate dissolved in water.

Arsenic.

Poisonous doses of arsenic are often given to horses maliciously, and also by ignorant persons to improve the condition of the animals, in which case the poisoning may be either acute or chronic.

Horses have taken three drachms of arsenic without harm resulting to them. Half that amount given in solution on an empty stomach would probably kill.

Symptoms of Acute Arsenical Poisoning.—Great abdominal pain; depression; pulse rapid, small, and irregular; breathing hurried and painful; frequently diarrhœa is present.

Symptoms of Chronic Arsenical Poisoning.—Eyelids are puffy, and the eyes irritable and watery; depression; breathlessness, if put to fast work, which would not inconvenience the animal were it in its usual state of health. There is sometimes a scaly eruption of the skin, due to the administration of this drug.

Treatment of Acute Cases.—Give a pint or more of the solution of dialysed iron (which can be got at any chemist's shop) mixed with a quart of water, and repeat; or give half-a-pound of freshly-prepared sesquioxide of iron mixed in warm water; or magnesia in unlimited quantities. If these be not at hand, give castor-oil, linseed or any other sweet oil, or butter or, in India, *ghi*, frequently and in large quantities. If the weakness be great, give spirits freely. After the acute symptoms have subsided, inject 5 grains of morphine hydrochlorate, dissolved in water.

Treatment of Chronic Cases.—Stop the arsenic, and attend to the animal's general health.

Bee Stings.

Remove the sting. Apply ammonia, a strong solution of washing soda, chloroform, carbolic oil, or a raw sliced onion. Give a liberal amount of spirits if the depression be great.

Belladonna.

Atropine is the active principle of belladonna.

A horse can take by the mouth an ounce of extract of belladonna, or 3 grains of atropine, without dying from it.

Cases of poisoning may arise from liniments being given inadvertently as drenches, or from overdoses.

Symptoms.—Dilatation of the pupils; insensibility of the eyes to light; dryness of the mouth, excitement and nervousness, unsteady gait; finally, sleep and recovery, or death.

Treatment.—Give two or three bottles of spirits diluted with water, or large quantities of strong coffee. Inject hypodermically 5 grains of morphine hydrochlorate dissolved in water, a few times. If the urine is not freely voided, draw it off with a catheter.

Bhang.

This drug is frequently given in India to horses to render them quiet for the time, and also to improve their condition. It is composed of the leaves and capsules of the *Cannabis Indica*. It acts like opium and spirits in causing excitement, followed by stupor and insensibility; the pupil is dilated.

Treatment.—Give a full dose of aloes, say ¾ oz. Administer strong tea or coffee.

Cannabis Indica

See "Bhang."

Cantharides.

Horses are poisoned sometimes by these blistering flies being given in excessive quantity, in condition or other powders or balls; or by too large a surface of the body being blistered by them, in which case the active principle (*Cantharidin*) is absorbed. A drachm and a half given by the mouth would probably cause death.

Symptoms are those of inflammation of the stomach and intestines. Flow of saliva from the mouth. Intense irritation of the urinary organs. Continued attempts to urinate, but little passed, and that mixed with albumen, the presence of which is characteristic of the poison. The urine may also be mixed with blood. High temperature; convulsions.

Treatment.—Give large quantities of white of egg (raw) and water, gruel, barley water, or gum and water. No oil should be administered, as it will dissolve and distribute the cantharides. Two or three ounces of laudanum may be given to soothe the pain.

Carbolic Acid.

A poisonous dose would probably be about 3 or 4 oz.

Symptoms. — Intoxication; mucous membrane of mouth white and hardened; pupils contracted; urine very dark; shallow and difficult breathing; pulse small, frequent, and in bad cases irregular; great weakness and insensibility.

Treatment.—Give 2 lbs. of Epsom or Glauber's salts dissolved in a couple of quarts of water, and repeat if necessary. These salts form harmless sulpho-carbolates. In default of these, give large quantities of white of egg (raw) in water or any sweet oil. Administer full doses of spirits and water to keep up the strength.

Caustic, Lunar

May be swallowed by accident when the mouth is being cauterised. Give 4 oz. of common salt dissolved in water at short and repeated intervals.

Chloral.

Death arises from paralysis of the heart.

Treatment.—Give strong tea or coffee; hand rub the body vigorously; rouse the patient by slapping and speaking to him.

Chloroform.

Overdoses usually occur when preparing a horse for an operation. The dangerous *symptom* is stoppage of breathing. I may say that as long as the breathing is all right there is practically no danger.

Treatment.—Draw the tongue out. Give the animal plenty of air. Dash cold water (and, if procurable, warm water alternately) in his face. Keep his head low. Try to set up artificial respiration by turning the animal alternately on his back and side, at intervals of about 5 or 6 seconds. Give him (so as to act agreeably to the advice, in human practice, of Dr. Murrell) two or three sharp cuts with a whip or cane across the chest, in order to restore the action of the heart.

Colchicum Autumnale (Autumn Crocus or Meadow Saffron).

Mr. Broad, of Bath (*Veterinarian*, April, 1856), mentions two cases of horses dying from eating in their hay the stalks, leaves, and seeds of colchicum. The symptoms were colic, distension of the belly with gas, and great depression. They died after 24 hours.

There have been several other instances. In human cases there is intense thirst, profuse perspiration, and persistent purging, the stools being mixed with blood; in fact, the symptoms are similar to those of Asiatic cholera.

Treatment.—Give frequent ounce doses of tannic or gallic acid, or large draughts of strong boiled tea. Give spirits and water if the depression becomes alarming. Inject hypodermically 5 grains of morphine hydrochlorate dissolved in water.

Copper.

The salts of copper in most common use are bluestone (the sulphate) and verdigris (the subacetate). About 3 oz. of either of these would kill a horse.

Symptoms.—Colic; diarrhœa, mixed with blood; great depression; hurried and difficult breathing; convulsions; death.

Treatment.—Large quantities of white of egg (raw) and water, milk, gruel, or arrowroot. Inject hypodermically 5 grains of morphine hydrochlorate dissolved in water, or give 6 oz. of laudanum in water as a drench.

Chronic Poisoning occasionally occurs among animals depastured in the neighbourhood of copper-smelting works, but such effects are apt in part to depend upon the arsenic present in these ores. The prominent symptoms are impaired appetite, constipation, imperfect nutrition, muscular weakness, and occasionally bloody urine. (*Finlay Dun.*)

Corrosive Sublimate (Perchloride of Mercury)

May be given by mistake for some other white powder. Its great weight is characteristic. About a drachm and a half is a poisonous dose for a horse.

Symptoms.—Great pain; profuse purging; dung mixed with mucus and blood; skin cold and moist; breathing difficult. The intelligence remains unimpaired up to the last. Death results from failure of the heart.

Treatment.—Unlimited amount of white of egg, which forms an insoluble albuminate; gruel made with flour, arrowroot, or oatmeal. Give spirits and water if depression be extreme.

Creosote.

See "Carbolic Acid."

Croton.

The oil or seeds are sometimes ignorantly given to the horse as a purgative. Twenty drops of the oil, or a similar number of the seeds, will usually kill a horse.

Symptoms are those of violent purgation and inflammation of the stomach and intestines.

Treatment.—Give large draughts of soothing drink, such as gruel, white of egg and water, and arrowroot; half-an-ounce of spirits of camphor, which may be repeated four or five times; spirits and water, or 6 oz. of laudanum.

Indian Hemp.

See "Bhang."

Lead.

The poisonous salts of lead in ordinary use are: sugar of lead (the acetate), white lead (the carbonate) and the subacetate employed in making Goulard's extract. I have never heard of a horse becoming affected by acute lead poisoning. The chronic form is not unfrequent. It may arise from eating grass grown near lead-smelting works; from drinking water contaminated by lead pipes or lead cisterns ; or from eating lead—*e. g.*, bullet spray, scattered over grass near rifle butts.

Symptoms of Acute Lead Poisoning.—Colic ; cramps ; convulsions.

Treatment of Acute Poisoning.—1½ oz. dilute sulphuric acid in 3 pints of water ; 1 lb. of Epsom or Glauber salts, which may be given with the acid, or separately, and repeat if necessary ; white of egg (raw) and water ; milk. To allay pain, inject hypodermically 5 grains of morphine hydrochlorate dissolved in water, or give 6 oz. of laudanum as a drench.

Symptoms of Chronic Lead Poisoning.—Paralysis of the limbs ; difficulty in breathing ; swelling of the knees and fetlocks ; hidebound ; emaciation ; appetite and digestion impaired ; a blue or grey line (caused by the presence of sulphide of lead) along the edge of the gums.

Treatment of Chronic Lead Poisoning.—At once remove the animal from the causes of the poisoning ; give dilute sulphuric acid, Epsom or Glauber salts, as advised in acute cases, twice a day for four or five days. After that give ¼ oz. iodide of potassium (to eliminate the lead from the system) twice a day for a fortnight or three weeks. Any swelling of the limbs might be painted with tincture of iodine. The paralysed muscles should be well hand-rubbed three times a day. Inject 25 minims of a solution of hydrochlorate of strychnine (1 to 100) into the paralysed muscles twice a day. Feed the animal liberally.

Liquorice (Indian).

The seeds of this plant (*Abrus precatorius*) are employed throughout India as a weight (*rutti*, which is about 3 grains) both by native jewellers and druggists. "In India they are used illegitimately for killing cattle, especially by the chumar or skinner caste. The seeds are powdered, moistened with water, and then rolled into little pointed cylinders or needles, called *suis*. The *sui*, or *sutari*, as it is sometimes called from its resemblance to a cobbler's awl, is dried and fixed into a wooden handle. The animal is stabbed with one of these instruments, the point being left, and dies within a few hours." (*Murrell.*) The activity of the abrus depends on a ferment. It does not contain an alkaloid. I have heard of several cases of horses being poisoned in this manner; but I have never seen one, nor have I ever read a description of the symptoms. As to treatment, Dr. Murrell suggests the free administration of stimulants (whisky or brandy).

Lunar Caustic.

See "Caustic Lunar."

Meadow Saffron.

See "Colchicum."

Morphia.

See "Opium."

Nux Vomica.

The active principle of nux vomica is strychnine, either of which may be given maliciously. About 15 grains of strychnine will kill a horse.

Symptoms.—Violent and continued spasms, which cause death by stopping the breathing.

Treatment.—Give large doses of spirits (a couple of quarts of whisky or brandy) and water, or two ounces of chloral in water. If the chloral cannot be given by the mouth, inject it hypodermically; or make the animal inhale chloroform.

Opium.

It takes as a rule about 2½ oz. of opium, or 100 grains of acetate of morphia, to kill a horse.

Symptoms.—Sleepiness; stupor; staggering gait; relaxation of the muscles; breathing slow; pulse weak, soft and slow; delirium; unconsciousness; convulsions; and death. In horses the pupil is often dilated. There is always a previous period of excitement, which, in the case of poisonous doses, is very short. The smell of opium may be detected in the breath.

Treatment.—Do everything to rouse the animal. Give large draughts of strong coffee or tea. If he cannot take them, give them as an enema. Inject 2 grains of sulphate of atropine, dissolved in water, and repeat if necessary. Make him inhale nitrate of amyl. Try and set up artificial breathing. (See page 469).

Phenol.

See " Carbolic Acid."

Snake Bite.

Symptoms.—Shock; swelling of the part; faintness; paralysis; unconsciousness; convulsions; death.

Treatment.—If on the limb, place a tight ligature (cord or handkerchief) on it between the wound and heart. " The ligature should be removed for a second or two at a time, and then quickly reapplied so as to admit only a small quantity of the poison into the circulation." (*Muller.*) Open out the wound with the knife, and freely cauterise with a red-hot iron or with some strong acid. Give large amounts of spirits (brandy or whisky) and water. The hypodermic injection of strychnine (say, a solution of 8 grains of the hydrochlorate) has been recommended.

Strychnine. (See "**Nux Vomica.**")

Yew.

"Many instances of death from browsing on the leaves of the yew tree (*Taxus Baccata*) have been recorded. After death, which in some cases takes place in from two to three hours after the ingestion of the foliage, the stomach has been found contracted and inflamed. The method of treatment to be adopted in cases of yew-tree poisoning is the administration of a pint of linseed oil, with two ounces of spirit of ammonia [dilute] and one ounce of nitric ether. In a couple of hours this draught may be repeated, and again after an interval of four hours, the ammonia and ether may be given alone in a pint of gruel." (*Cresswell.*)

CHAPTER XVIII.

DETECTION OF LAMENESS.

In no branch of veterinary knowledge is professional skill better displayed than in the detection of lameness, which the ordinary amateur, unless in very obvious cases, will find a most perplexing affair. I would strongly advise the horse owner to consult a veterinary surgeon on all questions of soundness; for no one who has not undergone a professional training is competent to thoroughly investigate such points. Besides this, a M.R.C.V.S. is the only person whose opinion is, legally, worth anything. However, as horses frequently go lame, and as owners, especially in India and the Colonies, are often unable to procure the assistance of a veterinarian; I beg to offer the following notes on the subject.

We may consider the detection of lameness under two aspects :—(1) When the man who "shows off" the horse endeavours to make him stand or move in an apparently sound manner. (2) When the examination is entirely under one's own control.

In the first case, an unwary purchaser may be easily deceived by a clever "coper," whose usual dodges are as follows :—

Before the horse is brought out of the stable he is "warmed up" by being threatened with the whip and voice, so that he may forget the pain in his feet and legs, and be ready to dance and prance about at the slightest sign from his inhuman master.

The softest ground is chosen on which to show off his action.

He will be led in a curb or Pelham—not a snaffle—and be held tight by the head, which will be kept in a raised position, so as to prevent him from "nodding" it. Some excuse will be framed for not letting him trot; but if that pace be insisted on, he will probably be led on the sound side, if lame in front, with his head turned away from the affected limb. Or he may be ridden with a sharp bit and tight curb chain.

If the horse be lame on one fore leg, and it be feared that a somewhat strict examination will be made, the coper may "bean" the sound foot. In former days, this operation was performed by inserting a piece of iron or other substance, resembling, in some slight degree, a bean in form—hence the name—between the shoe and the sole of the foot, so that the animal was made as lame on the sound limb as he was on the diseased one. His apparent stiffness of gait might then, if remarked upon, be accounted for by alleging want of action, natural manner of going, etc. This operation was at best but a clumsy contrivance; for it was always open to detection on examination of the foot, or on removal of the shoe. Now-a-days, they bean in a far cleverer way by paring down the foot, after removing the shoe, so that the horse will go tender when it is put on again. By practice, men learn to regulate the degree of tenderness with great skill.

Leaving the copers to the prosecution of their nefarious trade, we will consider the examination of the horse under the most favourable circumstances.

Mr. Percivall defines lameness "as the manifestation in the act of progression, by one or more of the limbs, of pain or weakness, inability or impediment." Under this heading we may, for convenience sake, include "pointing" of the foot, any abnormal position assumed by the horse, and altered action which indicates unsoundness. Irregularity of gait is commonly supposed to constitute lameness, but we may have a lame horse going level when he is equally affected in both fore, or in both hind legs. Although deficiency of action is its usual cause, we find that, in stringhalt, lameness is due to its excess.

In the examination of a horse for lameness, we should first endeavour to find out the affected leg, and then we should try to discover the seat of the disease in that limb. When it pains a horse, whether moving or standing still, to put the natural share of weight on any particular leg, or to bend it, or when he is unable to bend it with freedom, he is then *lame*. Hence, to detect lameness, we should endeavour to observe any tendency to favour one limb, or disinclination or inability to bend it; or any want of freedom in the gait.

Pointing.—Our first step should be, if possible, to see the animal in the stable when he is standing quietly, and is free from all excitement. He will then, *if sound*, often rest one hind leg by bending its fetlock, while he keeps both fore legs firmly planted. He will, after a time, ease the other hind leg, which, in its turn, will be relieved by its fellow, and so on. Although he may stand with one fore leg slightly advanced beyond the other, still it will never, unless when diseased, be relieved of its own share of weight; for he will always stand, when on level ground, with an equal bearing on both fore legs. A fatigued horse may rest a near hind and an off fore, or an off hind and a near fore, alternately, without disease. A horse lame in one fore leg, usually, stands with its pastern straighter than that of the sound one.

If we find that the animal points with one foot, while maintaining a position which indicates that he prefers to stand in a constrained attitude than to put weight on it, we may reasonably suspect that limb.

As a general rule, when the disease is in the front of the foot, the animal rests his heel on the ground; when towards the heel, he points with the toe. The former is the case in laminitis, and generally in ringbone; the latter, in confirmed navicular disease.

In almost all cases of pointing, when the disease is not in the foot, the horse keeps the foot flexed, and the heel consequently raised.

In bad cases of lameness in the hind leg, the animal often keeps the foot altogether off the ground.

At the commencement of navicular disease, the horse sometimes points with the heel down, but he soon commences to bring the toe only to the ground, and to "round" the fetlock joint. "In other cases the patient will stand perfectly firm, although in the great majority of cases the pastern of the lame limb is more upright than that of the sound one, as if he feared to put much weight on it." (*Williams.*)

Lameness is, often, manifested by the horse frequently shifting his feet when standing.

"The pointing of elbow lameness is characteristic, the fore-arm being extended, the knee in a state of flexion, and the foot perhaps on a level with, or posterior to its fellow. In severe shoulder lameness, the pointing, if it can be called such, is backwards, the limb relaxed, knee bent, and the foot posterior to its fellow; sometimes the toe only touches the ground; the whole limb semi-pendulous, consequent upon the inability of the muscles to elevate and bring it forward without pain." (*Williams.*)

In laminitis, when the disease is in the fore-feet, the horse advances them so as to relieve the toes of pressure; when in the hind-feet, he draws back his fore-feet, and advances his hind with the same object.

Animals affected with navicular disease, often acquire the habit of lying down a great deal in their stalls.

Cases of slight lameness behind, such as those of spavin and stringhalt, are often best seen when the horse is pushed over from one side to the other, or when turned round in his stall. We may then observe that the horse shifts the weight on to one hind leg, quicker than he does on to the other, which we may regard as the unsound limb.

Detection of Lameness during Movement.—Lameness must be very acute for the horse to show it in the walk. As a rule, the slow trot is the best pace at which to observe lameness. The animal should be led in a halter or snaffle bridle with plenty of rein, so that the man who leads him may not interfere with the movements of his head. As soon as possible after leaving the stable, the horse should be trotted for inspection on hard ground, which should be free from stones and inequalities. The observer may stand about twenty yards in front of the horse and on the near side. He should note, as the animal approaches, whether he "dwells" in the slightest on one fore-foot more than on the other, and whether he nods his head. If he does either, the observer may conclude that he dwells on the sound limb, and nods his head as it comes to the ground;

and that the other is the lame leg, which the animal naturally favours by throwing the weight on its fellow. An exception to this is when a horse is very lame on a hind leg, the near one for instance; he may then nod his head on the off fore coming to the ground, so that he may throw as much weight in front as possible, which he of course does to the sound side. When a horse is very lame in front, he may chuck up his head on the lame leg coming to the ground.

If a horse is lame on both fore feet, he will go short and stiff on account of his unwillingness to put weight boldly on either infirm leg; and, consequently, there will be absence of free bending of the joints. If we suspect him of being equally lame on both fore feet, we should take him on to soft ground, and there have him slowly trotted. If a marked amendment in the gait is then observed, we may regard our suspicions as confirmed: the time to observe him is when turning.

Veterinary authorities generally advise a person who is trying to find out if a horse be lame behind, to take a rear view of the croup in order to see if the animal "hitches up" one quarter (that of the unsound side), more than the other, in its endeavour to keep weight off the painful limb. I venture, however, to say that the horse "hitches up" the quarter in a manner sufficiently marked to attract attention, only when he is very decidedly lame. In all slight cases, I would prefer to watch (from behind and at both sides) if he dwelt more on one hind foot than on its fellow (the unsound one), or if he raised it higher off the ground when trotting; and, particularly, if he dragged one toe (that of the unsound side).

When the horse has trotted past about thirty yards, he should be turned, somewhat sharply, to the "right about" (for instance), and the person who is examining him should note the manner in which he turns on his off hind leg, so as to be able to compare it with the way he goes to the "left about," the next time he turns. In this second trot past, the observer should try to detect if there be any difference in the action of the horse, as viewed from the off side, from that which it presented when regarded from the near. If after two or three trots past, there be still any doubt remaining, perhaps the best way to solve it is to mount the animal or put him in harness, and trot him, alternately, slowly and rapidly, for a short distance on hard ground, and give him a few moderately sharp turns.

If we suspect the existence of spavin, we may take up the foot and bend the hock, retaining it in that position for about a minute. If, after that, the animal trots quite sound, we may consider the joint to be all right.

In obscure cases of lameness, we may suspect bone disease—such as incipient ringbone—as the cause, if the horse stands level in his stall, but trots very lame on hard ground.

Before putting the horse in, we should try if he backs with freedom and regularity of gait.

If no lameness be noticed, we may send him back to his stable, and, as a final test, may allow him to stand for a few hours, and then, when he has thoroughly cooled down, try him again. If he passes satisfactorily through this second ordeal, we may, as a rule, regard him to be sound in limb.

Certain obscure cases of lameness can be detected only during the first few steps the animal takes on quitting his stable; for he may subsequently "work sound." Such cases are usually caused by insidious and serious disease at its early commencement. They are quite beyond the skill possessed by the ordinary amateur.

Lameness at its first commencement, in the 'cross country horse, is often evinced by want of customary freedom and boldness in fencing; and in the race-horse, by a slight shortening of stride; by unaccustomed inability to "act" well on hard ground; by his showing an unusual preference for leading with one leg rather than with the other; or by his changing his leg oftener than he was wont to do.

Peculiarities of Action.—"Some horses, from bad riding or driving, acquire a sort of *hitch* or *lift* in their trot." (*Percivall.*)

"There are some horses which walk downhill in so peculiar a manner that they may be supposed to be lame. This kind of walk has been termed a three-cornered walk. The animal sways from side to side most awkwardly; his hind quarters being turned to one side or the other, going forwards *broadside on*, similar to an animal going downhill with a heavy load behind him." (*Williams.*)

If a sound horse, when trotting, has his head turned towards the man who leads him, going in a sort of "left shoulder in" fashion, he may appear to be lame on the near fore-leg, on account of stepping shorter with it than with the off fore.

Some horses, when trotting very fast, appear to go lame behind, by reason of the hind legs not being able to keep time with the fore.

I have known a horse always to go lame in harness, although he went quite sound in saddle; the cause being that, on a previous occasion, when working between the shafts, one of his shoulders became galled, and continuing the work for some time in this state, he acquired the habit of bearing against the collar as much as possible with the other shoulder.

Intermittent Lameness may be caused by rheumatism, and may also characterize the early stages of navicular disease.

Lameness improves with exercise, except, as a rule, in cases of splints, sore shins, corns, chronic laminitis, inflammation of the coronet (villitis) and sprains.

A horse suffering from navicular disease goes uphill sounder than he goes down; the reverse is the case in laminitis.

When the animal is lame behind, the disease is generally in the hock; when in front, in the feet of cart-horses, or in the suspensory or check ligaments of those that are used for fast work.

When a horse goes lame on a fore-leg without any perceptible cause, and wears away the toe of the shoe, we may suspect that foot of navicular disease. But if he goes on the heel, the probability is that he has either laminitis or incipient ring-bone. If the lameness be behind and the toe becomes worn, we shall generally find that it is due to spavin.

Side-bones are chiefly confined to cart-horses, sore shins to race-horses, and navicular disease to cab and carriage horses. Navicular disease and occult spavin are hardly ever found in horses under seven years of age.

CHAPTER XIX.

NURSING.

THE SICK BOX—CLOTHING—FEEDING SICK HORSES—LAXATIVE FOOD—NOURISHING FOOD—WATER—SALT—GROOMING—EXERCISE.

The Sick Box.—If practicable, the horse should be placed by himself in a loose box, which should be comfortable, scrupulously clean, well bedded down, properly ventilated and free from draughts. As sick horses are seldom able to feed heartily, they should, as a rule, be kept in a warm atmosphere, in which the waste of tissue will be less than if the air were cold. Warmth being specially indicated in diseases of the chest and air passages, great benefit will be obtained, in such cases, if the box is artificially heated by some means which will not vitiate the air. Warmth is also essential for the proper treatment of many ailments, in which, keeping the skin in healthy action is a necessary condition. Again, it is always better to have the horse warm by raising the temperature of the atmosphere of his box, than by clothing, which is apt to fatigue and annoy him. Means should be taken to prevent any heating apparatus employed, from rendering the air which the animal breathes, too dry.

Thorough ventilation should be obtained without creating any draughts. This is best done according to the principle advocated by Dr. Parkes, and exemplified by the plan of ventilating an ordinary room by raising the lower sash of the window a few inches, and closing up the open space below the bottom of the sash by a board. Ventilation will then be obtained between the two sashes without a draught, *i.e.*, without the existence of a direct current of air.

The foregoing remarks on ventilation have been made with special reference to temperate and cold climates; for in tropical countries, a draughty position would often be preferable to a sheltered one.

Unless the horse requires to be tied up, or is in slings, he should be kept, as a rule, in a loose box, so that he may lie down, or move about as he chooses.

Saw-dust will often be better than straw as bedding in cases of lameness; for it accommodates itself more readily to the animal's movements. The same may be said of moss litter, which has also a cooling effect on the horse's feet.

Clothing.—If the proper conditions of warmth cannot be obtained by means of the temperature of the sick box, we should employ, for this purpose, clothing, which should be light as well as warm, and should be changed, beaten, brushed, and dried, as circumstances may require. If the horse has an irritable skin, a cotton sheet may be used between it and the body-piece.

Feeding Sick Horses.—The appetite of these animals should be tempted by presenting them with daintily prepared food. Its nature should be judiciously varied and it should be given in small quantities and often. Any that remains should be removed and the manger cleaned, so that the patient may not become disgusted by having any rejected sour messes under his nose.

Food and drink should not be forced on a horse; for we should remember that the state of his appetite is the best guide by which we may know whether his system requires food or not.

Laxative Food.—Under this general term, we may place a number of articles of diet, which are useful in allaying inflammatory symptoms by inducing and keeping up a lax condition of the bowels, and in promoting the excretion of waste material from the system. They also support the strength. The following list comprises the usual ones employed:—

Green grass.
,, wheat.
,, oats.
,, barley.
Lucern.
Carrots.
Parsnips.
Gruel.
Bran mash.
Linseed and bran mash.
Boiled Barley.
Linseed tea.
Hay tea.
Linseed oil.

To the above we may add, for use in India, sugar cane, bamboo leaves, boiled *moong*, boiled *urud* and boiled *kulthee*.

The employment of laxative food is specially indicated during the acute stages of inflammatory diseases, and in cases of injury.

Green grass, lucern and similar articles of fodder should be dried before being given, if cut when in a wet state.

Boiled grain should be cooked with a minimum of water, so that it may be comparatively dry, when it is taken off the fire. Salt should always be given with it.

"One gallon of good *gruel* may be made from a pound of meal, which should be thrown into cold water, set on the fire and stirred till boiling, and afterwards permitted to simmer over a gentle fire, till the water is quite thick." (*John Stewart.*)

To make a *bran mash*, scald a stable bucket, throw out the water, put in 3 lbs. of bran and 1 oz. of salt, add 2½ pints of boiling water, stir well up, cover over, and allow the mash to stand for fifteen or twenty minutes, until it is well cooked.

For a *bran* and *linseed mash*, we may boil slowly, for two or three hours, 1 lb. of linseed, so as to have about a couple of quarts of thick fluid, to which 2 lbs. of bran and 1 oz. of salt may be added. The whole should be stirred up, covered over and allowed to steam, as advised with a bran mash. The thicker the mash, the readier will the horse eat it.

Linseed tea is made by boiling 1 lb. of linseed in a couple of gallons of water until the grains are quite soft. It may be more economically done by using less water to cook the linseed, and afterwards making up the quantity of water to about a gallon and a half.

Hay tea may be prepared by filling a bucket, after scalding it, with good sweet hay, pouring in as much boiling water as the bucket will hold, covering it over and allowing it to stand until cold, when the fluid may be strained off and given to the horse. This forms a refreshing drink.

Linseed oil, in quantities of from ¼ to ½ pint daily, may be mixed through the food. It keeps the bowels in a lax condition, has a good effect on the skin and air passages, and is useful as an article of diet.

Nourishing food.—Under this heading I wish to include, more particularly, those foods which are specially valuable in supporting the strength, and which are consequently, indicated during the period of convalescence after debilitating diseases. The chief ones are: the various forms of "corn;" milk; eggs; bread and biscuits; malt liquor; wine, etc. *Milk* is, usually, given skimmed, and may be rendered palatable, at first, by mixing in it a little sugar. The horse may get one or two gallons of it daily. *Eggs* beaten up, or boiled hard and powdered, may be given along with the milk, as recommended by Professor Williams. I may observe that the yolk of egg consists almost entirely of fat; and that the white is largely composed of albumen, which is a flesh-former. Horses soon learn to become fond of *bread* and *biscuits*. A couple of quarts of *stout*, *ale* or *porter*, or half a bottle of *wine*, may be given daily. Malt liquor and wine have really very little nutritive value, their use being, chiefly, to stimulate the appetite; hence, when they fail to accomplish this object, we may conclude that they are doing little or no good, and, possibly, some harm.

The articles of diet mentioned under the heading of "laxative food," also possess valuable nutritive properties, though in varying degrees. They may be employed, with proper discrimination, in all stages of disease.

Water.—As a rule, the sick, as well as the healthy, horse should have a constant supply of fresh drinking water. The amount may be curtailed, and the "chill" taken off in some exceptional cases, as that of purging. In various diseases, it is well to slightly warm the water, the temperature of which, however, should not be raised to more than 80° F. The ill effect of drinking a quantity of cold water in the case of inflammation of the lungs, or congestion of the liver, for instance, would be to cause contraction of the blood-vessels of the intestinal canal, and, consequently, to increase the blood pressure in the affected organs.

Salt.—A sick animal should be allowed, at least, an ounce of salt a day, or a lump of rock-salt for him to lick should be kept constantly in his manger. Salt is not alone an excellent condiment, but it also promotes digestion and aids in the building up of tissue.

Grooming.—A horse that is weak and depressed should not be worried by unnecessary grooming. In all cases, it is well to sponge out his eyes, nostrils, and dock; smooth over his coat; hand-rub his legs; "strip" his ears; and take off the clothing he wore at night, and put on fresh clothing for use by day. The other portions of stable routine may be followed as may be deemed likely to promote the animal's comfort and health.

Exercise.—In cases of injury, it is generally best to keep the horse in a perfect state of rest until the accident has become repaired as much as circumstances will allow. After illness which has involved medical treatment, the owner should be most chary in permitting the horse to leave his stable until all danger of a relapse is past. The animal should, then, be brought very gradually on work again.

CHAPTER XX.

THEORY AND PRACTICE OF FEEDING AND WATERING HORSES.

ANATOMY OF THE DIGESTIVE CANAL—COMPOSITION OF FOOD—SKETCH OF THE PROCESS OF DIGESTION—ON WATERING HORSES—PRACTICAL RULES FOR FEEDING AND WATERING HORSES.

As many of the diseases of the horse are due to errors of diet, I have thought it advisable to give the following sketch of the theory of digestion, with a few remarks on its practical application.

Anatomy of the Digestive Canal.

The *mucous membrane*, which we may regard as the internal skin, lines the entire length of the digestive canal from the lips to the anus, and also lines the air and urinary passages, the interior of the ears, and the eyelids. It is continuous with the skin, and the skin is continuous with the membrane which secretes the horn of the hoof. These three surfaces are not alone continuous one with another, but are very similar in structure, and possess strong mutual sympathy. Thus, in catarrh, for example, the skin loses its polish and the intestines become irritable ; during an attack of indigestion, we have the condition of "hidebound ;" and inflammation of the feet may arise from superpurgation.

The horse has forty *teeth*—the mare thirty-six ;—twelve *nippers* in front, four eye or *canine teeth* (*tushes*), which are absent, or only in a rudimentary state, in the mare, and twenty-four back or *molar teeth*, which, by the side play of the jaws, form a powerful mill for the reduction of the forage. The grinding surface of the lower molars slopes upwards and inwards at an angle of about 25 , while the upper ones slope downwards and outwards at about the same angle.

The horse is provided with large *salivary* glands which secrete the saliva that is poured into the mouth during mastication.

The mouth communicates with the *gullet*, which is a narrow, dilatable, membranous tube. It is placed above the windpipe, the entrance to which is guarded by a cartilaginous valve (the *epiglottis*). The gullet, at its entrance into the stomach, is so constructed as to prevent the contents of that organ from being vomited up. The gullet is composed of the mucous membrane, which lines it, and of a muscular coat.

The *stomach* is supplied with a large number of glands which secrete gastric juice to aid in the process of digestion of the food. This organ has three coats—the mucous membrane, a muscular coat, and a serous covering (the *peritoneum*), which is a smooth, slippery membrane, the office of which is to prevent friction between the internal organs. The average capacity of the horse's stomach is from 3 to 3½ gallons.

The *small intestine* commences at the rearmost end of the stomach. It is about 72 feet long and about 1½ inches in diameter. Like the stomach, it has a mucous muscular, and serous coat. The *bile* (from the liver) and *pancreatic juice* (from the pancreas) are carried by a common duct into the intestine close to the stomach

The small intestine terminates at the *cæcum,* which is the commencement of the *large intestine,* and forms a *cul-de-sac* of about three feet in length, and of an average capacity of six or seven gallons. The large intestine is about twenty feet long. Its termination, which is called the rectum, and in which the dung becomes collected before being expelled, is straight.

Composition of Food.

Food is composed of—

Albuminous matters.
Starch.
Sugar.
Fat.
Mineral matters.
Woody fibre.

Before these constituents can be absorbed into the blood for the building up of the various parts of the system, they have to become dissolved ; for if they remained solid they would be unable to gain entrance into the blood-vessels ; blood being the vehicle for conveying the elements of repair to the various tissues, as well as for removing broken-up and waste matters. Digestion, then, is the process by which the food becomes dissolved. Sugar and mineral salts do not require any preparation to convert them from a solid to a fluid form. Woody fibre may be regarded as useful simply to supply bulk to the food, so that the stomach and intestines may be enabled to move it about, and to act as a mechanical irritant for preventing constipation. The albuminous matter or so-called muscle-formers, of which the white of egg is an example, is dissolved by the gastric juice; the starch, by the saliva and pancreatic juice; and the fat is made into a soapy solution by means of the pancreatic juice and bile.

Sketch of the Process of Digestion.

When food is taken into the mouth it becomes mixed with saliva, which is poured out from the salivary glands. The chief offices of the *saliva* are—(1) to moisten the food and render it easy to be swallowed; (2) to convert a portion of the starch of the food into a soluble compound, so that it can be readily absorbed; (3) to correct, by virtue of its alkaline nature, any undue acidity of the stomach; and (4) to supply to the stomach, by means of the bubbles it contains, a certain amount of air, which appears necessary for digestion. The salivary glands of the horse are larger than those of all other animals except ruminants (cattle, sheep, etc.) It has been proved by experiment that food is much more readily digested in the stomach when it has been previously mixed with saliva, than when moistened with water alone. It has also been proved that the drier the food, the more saliva is poured out into the mouth; while we all know that the drier the food, the more thoroughly must it be masticated before it can be swallowed. Experience, as well as the foregoing facts, proves that the food of the horse should, as a rule be given to him dry.

The principal object of chewing is to allow the digestive fluids to get free access to the various particles of the food.

Owing to the smooth surface of most grains, they can be much more readily swallowed when given whole, than when bruised or broken; hence, the advisability of these processes.

We may also conclude that a horse ought to be encouraged to eat his food slowly.

As long as the stomach is empty, gastric juice is not secreted; but when the food is swallowed, its presence sets up in the stomach a certain amount of irritation, which causes blood to be drawn to the part. The gastric glands, thus, receiving a large supply of material from which to manufacture gastric juice, pour it freely into the stomach. The office of the gastric juice is to change the albuminous matter of the food into a soluble form; by its antiseptic properties to prevent the food from becoming decomposed as long as it remains in the stomach; and, by dissolving the albuminoid envelopes which enclose the globules of fat, to enable it to become split up into a fine state of division, so that the fat or oil may be easily absorbed.

If the horse be worked soon after being fed, the exercise will cause the blood to be drawn away from the stomach to the muscles of the limbs and to the organs of breathing; hence, the secretion of the gastric juice will be more or less checked, and the food will be liable to become decomposed; the result of which would be that the stomach and intestines will become distended with gas, and the animal will suffer from colic. We may, therefore, lay down the rule that a horse should not be worked for at least two hours after he is fed, assuming that in that time his stomach will have nearly completed its task.

If a horse, soon (say, within an hour) after being fed, drinks a large quantity of water, or what would be but a fairly moderate quantity at other times, the fluid thus taken, is apt to dilute the gastric juice to such an extent that this secretion will be unable to prevent fermentation in the food which will, then, give off the gas that causes flatulent colic ; and it will also be unable to perform its office of dissolving the albuminous matters. Hence, we may take for granted that a horse should not be watered soon after he is fed.

If the food of the horse contains a large amount of moisture, as is the case when he is fed on quantities of boiled grain, rank grass, or turnips, such food may be the cause of derangement of his digestive organs, from the saliva being secreted in too small a quantity, and from the gastric juice being inordinately diluted by the water contained in such fodder.

The albumen and some of the starch of the food having become dissolved, and the fat split up into fine particles, the resulting fluid (*chyme*), according as it is prepared, leaves the stomach and enters into the small intestine, where it becomes mixed with the pancreatic juice and bile. The former dissolves the remainder of the starch, and, by reason of its alkaline nature, converts, with the aid of the bile, the fat into an emulsion or soap. The bile acts as a natural purgative, and prevents, by its antiseptic properties, the residue of the food from decomposing as long as it remains in the intestines ; and, also, encourages absorption (see page 433). Hence, deficiency in the supply of bile is followed by constipation, with derangement of the health, by reason of the absorption of deleterious gases from the decomposing food before it is expelled from the bowels ; and by loss of condition.

After the chyme becomes mixed with pancreatic juice and bile, it is termed *chyle*.

The liver of all the higher animals secretes a constant supply of bile, which is greater while digestion is going on than at other times. In the case of the horse, the bile flows directly into the small intestine. In man, cattle, sheep, dogs, etc., the bile flows into a reservoir, the *gall-bladder*, where it is stored up, to be discharged, however, when chyme enters the intestine. Hence, it would appear that animals provided with a gall-bladder should be fed at fixed intervals; but that the horse should have an almost constant supply of food.

In the stomach, the food is subjected to a churning process, which brings all its particles under the action of the gastric juice; while the intestines have a worm-like motion which expels the food onwards. If the food enters the small intestine in an unprepared state—as a result, for instance, of work soon after feeding, indigestion, etc.—it will irritate the bowel, and may cause it to contract in a spasmodic manner, the result being that the nerve fibres of that part of the intestine become unduly pressed upon, and colic ensues.

When there is an excess of albuminous matter in the food, the gastric juice is unable to convert the whole of it into a soluble form. The food then quits the stomach and enters the small intestine in an unprepared state, the result being that derangement of the intestines takes place; for the functions of the various portions of the digestive canal are liable to be thrown out of working order when unsuitable food is brought into contact with them. Thus, large quantities of beans produce constipation; and gram (in India), diarrhœa; both these foods being rich in albuminous matter.

The stomach of an animal is complex in proportion to the amount of preparation its natural food requires in it. Thus, we find that the stomach of weasels and ferrets, whose natural food is blood, which requires but slight modification, is little more than a mere enlargement of the gullet. The stomach of cattle is, on the contrary, extremely complex, consisting of one true and three preparatory stomachs. The stomach of the horse is small, and only half the surface of its interior is capable of performing the operations (excepting that of movement) which are necessary to digestion; the other half being merely a continuation of the gullet. Hence, we may conclude that fodder which contains a comparatively large amount of material that is difficult to digest, is unsuitable for the feeding of horses; although it may be well adapted to that of cattle.

The large size of the horse's intestines indicates that his food should be of a bulky nature although it should be easy of digestion.

If the food be given in too concentrated a form, the intestines will get too much work to do, and diarrhœa or other derangements will ensue. Hence, the advisability of allowing the animal hay at the same time as he gets his corn, or of giving him chopped hay mixed with it.

The small size of the horse's stomach, compared to the large capacity of his intestines, points to the fact that he should be allowed to eat very frequently.

The chyle becomes mixed in the small intestine with fluid secreted by certain small glands. This intestinal juice completes the solution of the undissolved nutritive matter of the food. Absorption commences in the small intestine, and is completed in the large one; the unappropriated matters being expelled in the form of dung.

On Watering Horses.

If a horse drinks water when digestion is not going on, the amount needed for the requirements of his system is absorbed with extreme facility, while the surplus remains in his intestines to be taken up by the vessels as the blood demands dilution. Food requires for its digestion a large quantity of various fluids, such as saliva, gastric juice, etc., which are derived from the blood, and contain at least 99 per cent. of water; hence, we may assume the propriety of watering horses before they are fed.

Experience proves that it is perfectly safe to water horses immediately after work, no matter how hot they may be, provided always that the water is not too cold; but that they are apt to get colic, or be otherwise injuriously affected, if they are allowed to drink largely after they have cooled down. It is important to recollect that the only harm cold water of itself can do the horse, when digestion is not going on, is the shock which its low temperature causes to the nervous system of the animal. A moderate degree of cold acts no doubt as a healthy stimulus, though its excess may injure by nervous shock. A quantity of cold water remaining unabsorbed in the intestines may cause contraction of the muscular coat of the bowels, and consequent colic or diarrhœa. The very time above all others that a horse requires a liberal drink of water, is when he is heated and exhausted from fast work; for his blood will then be in an abnormally thick state on account of the large amount of water, in the form of perspiration, etc., it has lost, and will, consequently, be unable to circulate with due facility. When a horse is heated, the small blood-vessels which are situated on the surface of the interior of the stomach and intestines, and whose office it is to absorb fluid, will, owing to the rapid state of the circulation, take up the water drunk with extreme rapidity. But if the horse be allowed to cool down without getting water, his blood will gradually recover its fluidity at the expense of the tissues. It is reasonable, then, to suppose that useless waste of tissue—of which water forms a component part—and consequent exhaustion, is entailed by stinting the horse of water when he is heated from exercise. Experience proves, both in our own persons and in that of our horses, that drinking a moderate amount of water when the man or animal is hot and tired from hard work, diminishes to a very great extent or altogether obviates any subsequent exhaustion and depression. An owner should exercise his judgment in guarding against the possibility of his horse getting water which is too cold.

I may state, generally, that the only office water performs in the internal economy of horses, is to keep the blood in a properly fluid state; hence, the advisability of having a constant supply of it in their stalls, and of their being frequently watered, within proper limits, when performing continued hard work.

Practical Rules for Feeding and Watering Horses.

1. Certain precautions have to be observed when using the following foods :—

Wheat is apt to prove indigestible on account of its glutinous nature, which prevents the digestive fluids from passing easily through its substance. If used raw, it should be bruised, and should then be mixed with bran or chopped hay. A couple of pounds of boiled wheat may be given once or twice a day if the horse requires soft food.

Beans, peas, and *gram* (in India) should not be given, if other suitable grain be obtainable, in larger quantities than five or six pounds daily. These foods should be crushed and mixed with oats, bran, chopped hay, barley, or with Indian corn, which forms with them a capital mixture; as they have an excess of muscle-forming material (albumen), while maize is comparatively poor in it.

Barley, if given, should be employed at first in small quantities; for, until the horse gets gradually accustomed to it, a full supply is apt to scour him. As the husk is hard and liable to make his mouth sore, barley should be bruised and mixed with chopped hay. It is the only grain which is generally used for horses in Syria, Egypt, and other Eastern countries. It is there mixed with wheaten or barley straw which has been broken into small pieces and thoroughly bruised by the native thrashing machine (Arabic, *noraj*). The chaff, thus treated, is called *tibben* in Arabic. A mixture of barley and *tibben* keeps horses in excellent condition without any other kind of forage. If, instead of *tibben*, chopped straw be used, the sharp ends of the latter will cause the horse's mouth to become sore. The same result is brought on by using barley by itself.

Boiled barley, when used to a moderate extent, is excellent for delicate horses, even when they are put to hard work.

Straw, except when it is cut and given green before the corn has matured, proves indigestible to the horse when it is given in the ordinary way, and in large amounts. It often produces obstinate constipation, and is a frequent cause of roaring. (See pages 291 and 296.) Over-matured and badly-saved *hay* is open to the same objection.

When making hay, the object should be to deprive the grass of its excess of water, so that it may keep without suffering any change in its nutritive properties. The greener in colour hay is, the better; so long as it is dry and sweet.

The only *roots* which seem to agree with the horse are carrots, parsnips, and, perhaps, Swedes in small quantities. Unripe roots of all kinds and the leaves of roots should not be given, as they are apt to cause diarrhœa and other derangements on account of the oxalic acid they contain.

2. As a general rule, grain, before being used for feeding horses, should be a year old. This fact is probably due to the necessity of the grain losing a portion of its moisture so as to allow the digestive juices (saliva, gastric juice, etc.) to soak through its substance. Some of the starch of the grain probably becomes converted into a substance (dextrine) which is more easy of digestion than the starch itself.

3. The horse's corn, as a rule, should be given to him dry and in a bruised condition. When the animal, from imperfect teeth or accident, has difficulty in chewing his food, his corn may be boiled. Certain grains, such as linseed, from the hard nature of their husk, require to be boiled, soaked in water, or ground fine, before being used.

4. The horse's daily allowance of corn should be divided into several (four, five, or six) feeds, which should be given at fixed hours. The larger the amount of corn, the oftener should the animal be fed.

5. The horse should be allowed hay at his feeding hours, so that he may give bulk to the corn by mixing hay through it, in the same manner as we eat vegetables and bread with our meat: or a pound of chopped hay may be mixed through each feed.

6. A horse in full work should not be stinted in the amount of hay he gets, provided it be fresh and sweet.

7. A horse should not be put to work, if possible, for at least two hours after getting a full feed.

8. On a journey, it is advisable to bait a horse frequently; for instance, every hour and a half, with some water—say three quarts—and a couple of pounds of corn.

9. Boiled food should always have salt mixed through it.

10. Greedy feeders may have chopped hay mixed through their corn in order to make them chew it properly.

11. Horses which are inclined to scour may have from two to four pounds of dry bran added to their daily allowance of corn, or a pound of chopped hay may be mixed with each feed, or some hay may be given before feeding. The object here of giving bran or hay is to increase the bulk of the food, so that the intestines may easily contract on it. Such horses should have a constant supply of water, or should be watered at frequent intervals, getting, in the latter case, only a little at a time.

12. The best rule for watering horses is to give them a constant supply of water in their stalls. If this cannot be conveniently done, they should be watered *before* each feed, or at least two or three times a day, according to the heat of the weather, before feeding.

13. After violent exertion, however hot a horse may be, he should get a moderate allowance of water to drink, say, about a gallon, care being taken that the water is not too cold. As pointed out by Sir Frederick Fitzwygram, there is far less risk of danger in watering

a horse at that time than there would be when he had cooled down.

14. On a long journey, a horse should be frequently watered.

15. A full amount of very cold water may prove injurious to a horse ; but a moderate amount, given under proper conditions, will never hurt him.

16. If it be not convenient to have very cold water chilled before giving it to a horse to drink, he may be allowed ten or fifteen "go-downs" at a time, at short intervals, till he has assuaged his thirst.

17. Soft water should be used in preference to hard, which often contains an amount of mineral matter that may have an injurious effect on the stomach and intestines, and may, consequently, give rise to colic and other derangements.

CHAPTER XXI.

VETERINARY MEDICINES.

N.B.—THE doses of the medicines prescribed in this book, are calculated for what would be suitable for an average hunter or charger, 15 hands 2 inches high, and 5 years old or upwards.

Doses according to Age.

For a yearling . .	$\frac{1}{3}$ that for an aged horse.
For a two-year-old .	$\frac{1}{2}$,, ,,
For a three-year-old .	$\frac{2}{3}$,, ,,
For a four-year-old .	$\frac{3}{4}$,, ,,
For a five-year-old .	full dose.

Doses according to Size and Class.

For a 15.2 hunter or charger, as laid down.
For a heavy cart-horse, $\frac{1}{4}$ more than for a hunter.
For a 14-hand pony, $\frac{1}{5}$ less than for a hunter.
For a 13-hand pony, $\frac{2}{5}$ less than for a hunter.

List of Medicines for a Stable of Five or Six Horses.

N.B.—For the benefit of my Indian readers, I have marked with the letter (*b*) those medicines which may be procured in Indian bazaars.

1. *Indispensable Medicines.*

Carbolic acid*, or Jeyes' Fluid .	1 pint.
Linseed oil (*b*)	8 pints.
Laudanum	1 pint.
or—	
Solid opium (*b*)	2 oz.
Turpentine, oil of (*b*) . . .	1 pint.

2. *Very Useful Medicines.*

Aloes (*b*)	8 oz.
Alum (*b*)	1 lb.
Ammoniæ, strong liquor . .	4 oz.
Bluestone (*b*)	1 ,,
Camphor (*b*)	4 ,,
Iron, sulphate of (*b*) . . .	2 ,,
Mercury, biniodide of . . .	½ ,,
Nitre (nitrate of potash) (*b*) . .	1 lb.
Nitre, sweet spirits of . . .	1 pint.
Soda, bicarbonate of (baking) (*b*) .	2 lbs.
Tartar emetic	4 oz.

3. *Useful.*

Ammonia, carbonate of . . .	2 ,,
Arnica, tincture of . . .	8 ,,
Arsenic (*b*)	2 ,,
Belladonna, extract of . . .	4 ,,
Cantharides	¼ ,,
Catechu (*b*)	2 ,,
Corrosive sublimate . . .	2 ,,
Epsom salts (sulphate of magnesia)	2 lbs.
Goulard's extract	1 pint.
Ipecacuanha	4 oz.
Iron, tincture of	4 ,,

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* Calvert's disinfecting carbolic acid may be substituted for the glacial and more expensive form. When given internally, a third more of it should be used than what would be required of the pure acid.

Nitric acid	2 oz.
Nux vomica (*b*)	2 ,,
Potassium, iodide of . . .	4 ,,
Sal-ammoniac (*b*)	2 lbs.
Silver, nitrate of	½ oz.

Acetic Acid

Is used for removing warts from delicate parts.

Ale, Beer, and Stout

Are excellent tonics, especially when the horse is recovering from the effects of some debilitating disease. A quart may be given three times a day.

Aloes

Is the usual purgative in veterinary practice. It ought to be employed with great care by amateurs; as its injudicious administration is most dangerous to the lives of horses to whom it may be given. Aloin (see page 513) is quite as effective and is much safer than aloes. Linseed oil will generally prove an efficient substitute.

Barbadoes Aloes is the dried juice of the leaves of the aloe plant which is grown in the West Indian islands. There are several other varieties, but their action is not as certain as that of the species we are considering.

Characters.—The best is of a liver-brown colour, presenting a dull fracture when broken, and of a dull yellow appearance when reduced into powder, an operation that is accomplished with some difficulty, which may be overcome by adding a few drops of ether. It is completely soluble in boiling water.

Composition.—It is composed of its active principle, aloin, mixed with certain resins and other substances.

Actions.—In small doses, it appears to act as a tonic,* and alterative † in improving the general health of the animal. In full doses, it is a purgative, though it acts sometimes as a diuretic. *Externally*, it may be used in the form of a fine powder, as an application to wounds.

It is rapidly absorbed into the system, and seems to be excreted into the large intestines, thereby increasing their motion.

Aloes generally takes from eighteen to twenty-four hours to produce a purgative effect.

As it appears to be a liver stimulant, one should be careful in giving it in cases of disease of that organ.

Doses.—As a tonic or alterative, 1 to 2 drachms; as a purgative, from 4 to 10 drachms.

The action of this drug is influenced by the breed and individual peculiarities of the animal; by the country in which he lives; by the nature of the food he eats; by the condition of his stomach at the time he takes the physic; by his state of health; and by the nature and quantity of the food and drink which he partakes of after getting the physic. Hence, as a rule, the cart-horse can take a very large dose with impunity; though a small one will move the thorough-bred.

Some horses, especially slack-loined, "washy" animals, are very easily purged. In Scotland, horses require about one-and-a-half times the amount of aloes which would do in the south of England or in Ireland. This, I believe, is owing to the large amount of woody fibre contained in the hay made in the first-mentioned country. My experience in India is that horses, there, are very amenable to the action of aloes. Animals fed chiefly on corn are more difficult to purge than are those which are kept on grass and other green food. When restricted to bran mashes, the bowels are readily acted upon. If aloes be given on an empty stomach, its effects will be far more severe than if that organ were in a full condition. Drinking cold water soon after this drug is given, increases its purgative effect. When there is irritation of the bowels—which may be manifested by diarrhœa or by the presence of mucus in the dung—and, generally, if there be existing any acute affection of the chest or air passages, purgation is easily excited by a moderate dose of aloes. Hence, it should not be used as long as the conditions just mentioned are present.

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* Tonics are medicines which permanently strengthen the body or its parts.

† Alteratives have certain beneficial though ill-understood effects on the nutrition of the system.

For an ordinary horse, such as a hunter or trooper 4½ or 5 drachms will usually be sufficient as a purgative; though 6 drachms may be given to the cart-horse. In Scotland the latter may safely get an ounce. In India I have usually found 4 to 4½ drachms quite enough for an ordinary animal.

Modes of Administration.—In most cases I would advise that the aloes should be given in a ball instead of in a drench; for in drenching there is danger of a part of the fluid getting spilt. If this occurs, it will be impossible to tell how much has escaped. Aloes is nearly, if not quite, as rapidly absorbed in a solid as it is in a fluid state; and, if given in the former condition, no uncertainty can exist as to the quantity swallowed.

If a physic ball does not act in a day or two, a second bolus should on no account be given for at least a week, lest severe if not fatal super-purgation may ensue. The same rule should be observed if a ball breaks up in a horse's mouth. One should remember that the longer aloes takes to act, the greater is the danger of super-purgation.

If possible, aloes should not be given, unless the animal is properly prepared for the physic (see page 512).

Aloes should not be given, as a rule, if the horse is in slings.

Alterative Ball.

Barbadoes aloes . . .	1½ drachms.
Tartar emetic	1 drachm.
Nitre	3 drachms.

Treacle or lard sufficient to form a ball.

Physic Ball.

Barbadoes aloes . . .	5 drachms.
Ginger	2 ,,

Treacle or lard sufficient.

I may mention that the presence of the ginger appears to increase the action of the aloes, and to diminish the chance of griping.

Strongly Purging Ball.

Barbadoes aloes . . .	6 drachms.
Tartar emetic	2 ,,
Ginger	2 ,,

Treacle or lard sufficient.

If required for immediate use, a ball may be made up by simply adding a little water to the powdered aloes, without any treacle or other substance to make its particles adhere together.

Physic Mass, as used at the New Veterinary College, Edinburgh. (To be kept ready for immediate use.)

Barbadoes aloes . . .	3 lbs.
Ginger	3/8 ,,
Olive oil	3/8 ,,
Treacle	1/2 ,,
Spirits of wine	1/4 ,,
	4½ lbs.

For every drachm of aloes, take 1½ drachms of this mass.

The following mass keeps well, and has been strongly recommended to me :—

Physic Mass.

Barbadoes aloes . . .	30 oz.
Cut Castile soap . . .	3 ,,
Castor oil	6 ,,
Syrup of buckthorn . . .	6 ,,

Boil together, and, while cooling, add—

Powdered aniseed . . .	3 oz.
,, ginger . . .	3 ,,
,, jalap. . . .	3 ,,

Add slowly—

Carbonate of potash . . .	2 oz.
Water	4 ,,

After dissolving the potash (which is added in order to prevent the ball getting dry), stir the mixture well.

For each drachm of aloes, use two drachms of this mass.

Solution of Aloes.

Powdered Barbadoes aloes .	1 part.
Water	7 parts.
Spirits of wine	1 part.

Dissolve the aloes with the water in a water bath, which consists of a vessel placed inside another vessel containing water. Care should be taken that the temperature of the solution does not at any time rise beyond 120° F. "Exposure to temperature exceeding 150° F. alters the composition of aloes and impairs its purgative property." (*Finlay Dun.*) When the aloes is dissolved, add the spirits of wine. An ounce of this solution will contain a drachm of aloes.

If time be an object, the aloes for a drench may be dissolved in a pint of warm water.

A quarter more aloes than would be required for a ball, may be allowed for a drench, in order to make up for loss by spilling.

Management of the Horse before and after giving Physic.—For at least a day before the physic is administered, the animal should be given only bran mashes and hay, and the allowance of the latter should be somewhat restricted on the last night. "The physic is given on an empty stomach, early in the morning; immediately afterwards a bran mash is given; that over, the horse goes to exercise for perhaps an hour, watered when he returns. The water should be as warm as he will take it, and he should have as much as he pleases throughout the day. Bran mash should be given as often as corn usually is, and better warm than cold; if both are refused, bran may be tried, but no corn, and but little hay. Sometimes gentle exercise may be given in the afternoon, and also next day. The physic usually begins to operate next morning, though it rarely takes effect in twelve hours, frequently not for thirty. When the physic begins to operate, the horse should stand in the stable till it *sets*, which may be twelve hours." (*Dick.*)

Physic is said to "set" when the evacuations cease to be watery, and the dung assumes its usual form.

Aloin

Is the active purgative principle of aloes, to which it should always be used in preference, if a little extra expense can be afforded. Probably the best kind is obtained from Barbadoes aloes, and is called Barbaloin. It acts quicker (in about 14 hours), and is safer, in that it causes less depression, loss of appetite, nausea, griping, and straining than aloes; and is quite as effective. Besides this, it is devoid of the sickening smell and taste of aloes, and it is not liable, like aloes, to set up excessive staling (diuresis), instead of purging. It is about 2½ times as active. Hence, 2 drachms of aloin will purge a horse quite as well as 5 drachms of aloes.

Alum

Is soluble in 18 parts of cold water. Its astringent effect is owing to its power of coagulating albumen. Dissolved in water, it forms a useful astringent lotion for wounds. *Burnt Alum* is prepared by heating to dryness, alum, placed over a fire on a metal or earthen plate.

Ammonia

Is used in making stimulating applications; and, internally, as a general stimulant. Liquor ammonia is made by adding two parts of water to one part of strong liquor ammonia (S. G. ·891.) In cases of sudden depression as advised by Dr. Whitla in human practice, one ounce of liquor ammonia (dilute) mixed with two ounces of water, may be injected into one of the veins.

Soap Liniment.

Soap.	2 oz.
Strong liquor ammoniæ . .	1 ,,
Water	4 pints.

Boil the water and dissolve the soap in it. When cold add the ammonia.

Stimulating Liniment.

Soap liniment	½ pint.
Strong liquor ammoniæ . .	1 to 2 drachms.

Ammonia, Carbonate of,

Is a most valuable stimulant. *Dose,* 1 to 2 drachms. If given in a drench it should be largely diluted.

Ammonium, Chloride of (Sal-ammoniac).

See page 437.

Arnica.

Internally, it is a useful stimulant. It appears to have a special action in increasing circulation in the surface of the body. *Dose* of the tincture, 1 to 2 oz.

Arsenic

Is an alternative and tonic. Its good effects, when given *internally*, are well marked in skin diseases. It should not be given continuously for more than ten days at a time ; as it accumulates in the system, and may tend to cause corrosion of the coats of the stomach and intestines. *Externally,* it is used as a caustic.

For treatment of arsenical poisoning, see page 466.

Dose, from 5 to 10 grains.

Arsenic is most conveniently given in the form of—

Liquor Arsenicalis.

Arsenic	1 part.
Carbonate of soda . . .	1 ,,
Water	96 parts.

Boil together until the arsenic is dissolved. Each ounce of this solution contains five grains of arsenic. Fowler's solution, which is used in human practice, contains four grains to the ounce. It is slightly scented, which makes it objectionable for veterinary use.

Atropine

Is the active principle of belladonna. $\frac{1}{5}$ to 1 grain of the sulphate of atropine, dissolved in about 100 parts of water, may be injected subcutaneously.

Beer.

See "Ale."

Belladonna.

See pages 257 and 330. *Externally*, a liniment composed of extract of belladonna and glycerine—of the consistency of thick cream—is a very useful application for recent sprains.

Blisters.

See "Cantharides" and "Mercury, Biniodide of."

Bluestone.

Or sulphate of copper, is a useful caustic.

Boric Acid

See page 171. Antiseptic cotton wool may be made by steeping cotton wool in boiling water which has as much boric acid in it as it will dissolve; then taking out the cotton wool and drying it.

Calomel

See page 525.

Camphor

Is, externally, a useful antiseptic, and allays irritation of the skin. As it is an antispasmodic, ½ oz. dissolved in a pint of oil might be given for colic. See page 517.

Cantharides.

Blistering Ointment.

Powdered cantharides . .	1 oz.
Lard (free from salt) . .	8 ,,

Place in an earthenware pot, which should be put into a kettle or other convenient vessel containing water, so that the mixture cannot be raised above boiling-point. Keep the water in the outer vessel simmering over a fire for five or six hours, and stir up from time to time. Strain and let cool.

Tincture of Cantharides

(for blistering the skin).

Powdered cantharides . .	1 oz.
Spirits of wine	1 pint.

Place in a bottle, which should be then corked, and should be shaken up from time to time. After the mixture has been treated thus for about a week, filter it through blotting-paper.

Carbolic Acid.

Is a powerful antiseptic (see page 170), and when applied, externally, is a soother of pain.

There are three forms of carbolic acid in general use, viz., the pure or glacial form Calvert's disinfecting, and crude carbolic acid. The first, except perhaps for internal use, is too expensive for employment in ordinary veterinary practice. When given internally, a third more of Calvert's preparation should be employed than would be necessary with the purer form. Crude carbolic acid, which is very cheap, may be used externally and as a disinfectant.

When carbolic acid is dissolved in water, its effect is stronger than when in combination with a similar quantity of oil or glycerine.

It (especially the impure kind) is sparingly soluble in water, but combines with glycerine in the proportion of 1 to 4, and may then be diluted by water to any required strength.

Carbolic acid combines with camphor in the proportion of 1 to 2½.

It is used *internally* in cases of anthrax or Loodiana fever, and flatulent colic in ½ oz. doses.

Externally it is used as a caustic (pure); as an application to wounds (1 to 40 of water, or 1 to 20 of glycerine or oil); or in combination with camphor.

Phenicated Camphor.

Carbolic acid	1 part.
Camphor	2½ parts.

Antiseptic Application for Wounds, etc.

Carbolic acid	1 oz.
Camphor	5 ,,
Resin or shellac . .	1 ,,
Methylated spirits of wine .	15 ,,

Useful for painful or indolent wounds.

I have found this to be a most valuable preparation for open wounds and sores, especially in hot climates. The carbolic acid acts as a stimulant and antiseptic;

the camphor is a sedative; the resin leaves a fine coating over the part to protect it; and the carbolic acid and camphor prevent flies from lodging on it.

Carbolic ointment is made with carbolic acid, 1; soft paraffin, 12; hard paraffin, 6 parts. In hot climates, the proportion of hard paraffin might be increased.

As a *disinfectant*, crude carbolic acid, "poured from the rose of a common watering can, may be used to the floors of buildings after dilution with an equal weight of water. Rugs, cloths, sacks, harness and stable tools, woodwork and ironwork, etc., may be washed with a soapy solution of the fluid. One pound of soft soap is boiled in a gallon of water, to which two pounds of fluid carbolic acid are added, and after being thoroughly incorporated is ready for use. It is of great importance to note that temperature has much to do with the decomposition of organic matter; therefore, when the carbolic solution is to be used, it should be as near boiling-point as possible—poured over the floors, brushed over wood and ironwork, etc., the rugs and harness being immersed in it, and afterwards scrubbed." (*Armatage.*)

To make a useful and convenient disinfectant, Dr. Voelcker recommends that sawdust should be soaked in as much of a solution of equal quantities of the crude acid and water as it will take up, and then set aside for use. A handful of this carbolized sawdust, sprinkled here and there in a stable, will tend to keep it free from foul emanations.

Carron Oil

Lime water Linseed oil	equal parts.

An application for scalds and burns.

Catechu

Is useful for checking diarrhœa. It possesses a very astringent taste. "Good samples are sweet, and free from bitterness and grittiness." (*Finlay Dunn.*)

Dose, 2 drachms.

The action of the Indian variety is weaker than that which is used in English practice.

Chalk.

Prepared chalk is a valuable antacid in diarrhœa; it also forms a mechanical protection for the mucous membrane of the intestines.

Dose, 1 oz.

Chiretta

Is a valuable stomachic. Its properties are very similar to those of gentian. It is common in India. If pounded and mixed in the food, horses will soon learn to eat it readily. Chiretta and nux vomica appear to be the only bitters which horses will voluntarily consume.

Dose, 1 oz. twice a day.

Chloroform

Is the agent used for producing insensibility in animals during surgical operations. From 1½ to 4 oz. are required for the horse. Chloroform should be kept in stoppered bottles, which should be covered with blue paper and placed in a cool position, (see page 553).

Chloric Æther

Is made by mixing 1 fluid part of chloroform with 19 fluid parts of rectified spirits. It is a very useful antispasmodic in cases of colic.

Dose, 1 to 1½ oz.

Citrine Ointment (Nitrate of Mercury Ointment).

See page 525.

Cocaine.

This alkaloid is a most useful agent for producing local insensibility to pain. If about 4 or 5 drops of a solution of 1 grain of the hydrochlorate of cocaine (which is the usual form of this drug that is employed) in 20 drops of water be placed on the surface of the eye, and repeated after ten minutes, that part will lose its sensibility, so that it can be handled freely without causing discomfort to the animal. The subcutaneous injection (see page 574), at three or four adjacent spots, of ½ grain of the hydrochlorate, will after ten minutes allow the skin to be cut without pain. This might be tried on both sides of a leg, on the spot selected for neurotomy (see page 560), for the temporary relief of foot lameness, as in the case of a race-horse about to run. With the same object, in the case of painful cracked heels, a solution of 4 grains of cocaine in 20 drops of oil of cloves might be applied to the part. The effect wears off in about half an hour.

Colloid, Styptic.

Collodion	10 oz.
Carbolic acid	1 ,,
Tannin	½ ,,

Dissolve. (*Tuson.*)

This is an admirable application for raw surfaces.

Copper, Sulphate of.

See "Bluestone."

Corrosive Sublimate

Is one of the best antiseptics (see page 170); and is useful for skin diseases. It is a deadly poison.

Creolin.

Is a patent coal tar product which is free from carbolic acid. It is also called Jeyes' Fluid. It dissolves in all proportions in water, with which it forms a milky solution. It is much less non-poisonous and less irritating to the skin or to broken surfaces than carbolic acid, and is equally effective as an antiseptic. ½ oz. of it might be given *internally*.

Epsom Salts (Sulphate of Magnesia)

Is a useful laxative in fevers, chest affections, and in derangements of the liver; its action, however, as a purgative is somewhat uncertain. It may be used when the dung is hard, clay-coloured—indicating suppression of bile—and covered with mucus, or when it is passed out in a slimy state, both of which two last-mentioned conditions show irritation of the bowels. In such cases, the employment of aloes is generally inadmissible, owing to its stimulating action on the the liver.

Epsom salts may be given daily in doses of 4 oz. in the food, or 8 oz. in one dose as a drench.

Ether, Nitrous Spirit of.

See "Nitre, Sweet Spirits of."

Gentian,

Is usually employed in powder. It is an excellent stomachic. *Dose*, ½ to 1 oz. It may be given in 1½ pints of ale or stout with 1 oz. of sweet spirits of nitre.

Goulard's Extract, imitation of.

"Acetate of lead	5 oz.
Oxide of lead (litharge) in powder	3½ ,,
Distilled water	1 pint, or a sufficiency.

"Boil the acetate and oxide of lead in the water for half an hour, constantly stirring; then filter, and when the liquid is cold add to it more distilled water until the product measures twenty fluid ounces. Keep the clear solution in well-stoppered bottles." (*Tuson.*)

As an application for cracked heels, mud fever, etc., use 1 part of the solution to 4 parts of olive oil, cream, or glycerine.

Iodine.

For its action in "Diabetes," see page 410.

Iodine Ointment.

Iodine	1 part.
Lard	8 parts.

Useful in cases of parasitic ringworm.

Application for Indurated Glands.

Iodine	2 drachms.
Oil of turpentine . . .	1 oz.
White liniment	1 oz.

(*Mr. A. Johnston, M.R.C.V.S.*)

Combine the first two ingredients, and afterwards mix in the liniment. Hydriodic acid is here formed.

White Liniment is made by mixing equal quantities of water and olive oil with the aid of a sufficiency of the carbonate of potash to form a soap.

Iodoform.

See page 171.

Ipecacuanha.

See page 436.

Iron.

Iron, Sulphate of,

Should be kept in well-stoppered bottles; for if exposed to the air it will gradually become decomposed. It is a valuable tonic. If it upsets the digestion, it should be discontinued.

Preparations of iron should not be employed in cases of indigestion, or of diseased liver (see page 437).

Dose, 20 to 60 grains once or twice a day, mixed in the food.

A solution of 1 lb. to the gallon of water is an admirable *disinfectant* for stables. When brought into the presence of ammonia and sulphuretted hydrogen, the ammonia becomes fixed by being converted into the sulphate; and the sulphuretted hydrogen is decomposed by having to yield up its sulphur to the iron.

Only green crystallized sulphate of iron should be employed for internal use. The impure kind will do for disinfecting purposes.

Dialysed Iron.

Solution of dialysed iron (½ oz.) diluted with water, to be given two or three times a day, is a very valuable tonic, and is not liable to act injuriously on the digestion, or on the liver (when affected) like sulphate of iron.

Iron, Tincture of,

The tincture of the perchloride of iron appears to act, when given *internally*, as an astringent to the walls of the blood-vessels; hence its use in bloody urine, etc. In such cases, it may be given in drachm doses three times a day. For diarrhœa, give 3-drachm doses twice a day, combined with 1½ ounces of laudanum. *Externally*, for stopping bleeding, use 1 to 8 parts of water.

Jeyes' Fluid.

See "Creolin."

Kerosene Oil (Paraffin Oil.)

Is used in parasitic affections of the skin.

Lanoline

Is the grease obtained from sheep's wool. It forms a useful vehicle for applying medicines to the skin. Fo its action as a hoof ointment see page 108.

Lard

Is one of the best materials for making up ointments. Its tendency to become rancid can be corrected by melting it over a water bath (see page 516) and adding a fiftieth part of benzoin. The usual adulterations of lard are water, salt, starch, and cotton seed oil. Mutton, venison, or beef kidney fat, horse fat, lanoline, goose grease, or vaseline, may be used instead of lard. To give any of these consistency in hot weather, we may mix with them a little beeswax.

Laudanum.

See "Opium, Tincture of."

Lime.

One part of lime is soluble in 1,500 parts of water. This solution (lime water) is beneficial to foals suffering from a deficiency of bone-forming material, and in diarrhœa when acidity is present. It may be given to yearlings in ¼-pint doses three times a day.

Linseed.

Cold drawn *linseed oil* is the most valuable laxative we possess, and is at all times the safest purgative in the hands of amateurs. It may be given in doses of from 1 to 2 pints. It forms the best vehicle for the administration of turpentine or carbolic acid. In small doses, it allays irritation of the mucous membranes, and appears to be particularly beneficial in diseases of the urinary organs. Its good effects on the skin are well marked. It may be given in doses of 2 oz. mixed through the food three times a day. See page 488.

As linseed oil is subject to much adulteration, it is advisable to have it made from the pure seed, under one's own supervision, if possible.

Magnesia, Sulphate of.

See "Epsom Salts."

Mercury.

Blistering Ointment:—

Biniodide of mercury . .	1 part.
Lard	8 parts.

For a strong effect, half the amount of lard may be used. In hot climates, the amount of lard should be double that used in cold countries. The blistering effect of biniodide of mercury passes off much quicker than that of cantharides.

Mercury, Chloride of (Calomel)

Is useful as an application for thrush; and to increase the purgative effect of aloes.

Mercury, Perchloride of (Corrosive sublimate)

Is one of the best antiseptics. See page 170.

Nitrate of Mercury Ointment (Citrine ointment).

The strong ointment, diluted with three or four times its weight of lard, vaseline or lanoline, is a very useful application in cases of cracked heels and other inflammations of the skin.

Nitre (Nitrate of Potash.)

See "Potash, Nitrate of."

Nitre, Sweet Spirits of.

Is a very useful medicine. It acts on the kidneys and skin, and is a good stimulant. *Dose*, 1 to 2 oz.; to be given in a pint of cold water.

Opium,

In moderate doses, is a stimulant to the brain and spinal cord. In large doses, it is a very powerful sedative. It checks the worm-like motion of the bowels; hence its use in enteritis and in cases of injury to the abdomen. Horses can take large quantities of it—even up to an ounce—with impunity.

Tincture of Opium.

Opium in powder . . . ,	1 part.
Water	4 parts.

Digest for twenty-four hours over a slow fire, while keeping the temperature from 150° to 200° F. Then add spirits of wine until 8 parts of the fluid contain 1 part of opium. An ounce of this will be equal in strength to a drachm of solid opium. 1½ oz. of *laudanum* is about equal in effect to 1 oz. of this tincture. I have prescribed laudanum throughout this book; as it can be obtained at any chemist's shop.

Morphine

Is one of the active principles of opium, which it resembles in its effects. A solution of from 3 up to 10 grains in extreme cases, may be injected subcutaneously (see page 574).

Paraffin Oil.

See "Kerosene Oil."

Potassium.

Potash, Bichromate of,

May be used internally for hastening the development of glanders (see page 400). The following preparations are recommended by French veterinary surgeons for chronic enlargements about the joints.

(1)	Bichromate of potash	1 part.
	Lard	8 parts.
(2)	Bichromate of potash	2 ,,
	Iodide of potassium	1 part.
	Mercurial ointment	32 parts.

Mix without applying heat.

Potash, Nitrate of.

This salt, which is called nitre or saltpetre, is a diuretic, and is given in doses of ½ to 1 oz. once or twice a day.

Potassium, Iodide of,

Stimulates the glands. *Dose*, ½ oz. during the day. It may be dissolved in the drinking water, or mixed in a mash. When added to iodine it increases its solubility. It is useful, in the form of an ointment (1 to 6 of lard), as an absorbent application.

Poultices

Are valuable as soothing applications, and also for cleansing wounds. They should be large, and should on no account be allowed to get dry.

For applying poultices to the feet, a *poultice shoe*, constructed as follows, may be used with advantage. Take a circular piece of hard wood, a little longer and broader than a horse shoe, and about 1½ inches thick. Get one surface of it rounded in a lathe, so that there may be a rise of about ¾ inch in the centre, while the other surface remains flat. Round the circumference of the board have leather nailed so as to form a convenient boot for retaining the poultice, and similar to the one in ordinary use, except that the part which comes on the ground is rounded. The fact of its being round will enable the horse, to whose foot it is applied, to ease the affected spot by throwing weight on the toe, the heel, or on either quarter, as he chooses.

The best *poultices* for general use are those made with turnips, carrots, or linseed meal. Bran, though light and convenient, dries very quickly; this defect, however, may be remedied, by adding to it a little linseed oil after mixing it with hot water.

To make a carrot or turnip poultice it is only necessary to boil a convenient quantity of these roots and then mash them up.

Bread Poultice.

Take a sufficiency of the crumb, place it in a basin, pour boiling water over it and cover it up for a few minutes. The water should be poured off and fresh boiling water added. It will then be ready for use. The change of water is made so as to get rid of the salts which are contained in the bread.

Charcoal Poultice.

" Wood charcoal, in powder	½ oz.
Linseed meal	3½ ,,
Boiling water	½ pint.

Add the linseed meal to the water, and stir them together, so that a soft poultice may be formed. Mix with this half the charcoal, and sprinkle the remainder on the surface of the poultice." (*Tuson.*)

Linseed Meal Poultice.

"Linseed meal	4 oz.
Olive oil	½ "
Boiling water	½ pint.

Mix the linseed gradually with the water, and then add the oil with constant stirring." (*Tuson.*)

Prussic Acid

May be used externally to allay irritation of the skin (see page 51).

Quinine.

The expense of this drug will generally preclude its use in veterinary practice. In the case of a valuable animal which may be recovering from a debilitating illness, it might be tried with advantage, in two drachm doses, twice a day, with a drachm of tincture of iron. Quinine, by itself, will require the addition of a little sulphuric acid to make it dissolve in water.

Sal-ammoniac.

See page 437.

Sodium.

Soda, bi-carbonate of (Baking Soda),

Corrects acidity of the stomach; allays in a marked manner, irritation of the mucous membrane of the intestinal canal; and assists the liver in purifying the blood.

Dose.—2 oz. daily in the food.

Soda, hyposulphite of.

See page 410.

Spirits.

Brandy, etc., may be given in ¼-pint doses, mixed with water. We should remember that when stimulants are given to keep up the strength in wasting diseases, they should be used only to improve the appetite. If they fail in this, they should be discontinued; for any apparent improvement in the strength will be obtained at the expense of the tissues.

Steel, Tincture of.

See "Iron, Tincture of."

Stout.

See "Ale."

Strychnine

Is one of the active principles of nux vomica. 1 to 2 grains of the hydrochlorate of strychnine, dissolved in 100 parts of water, may be injected subcutaneously.

Nux Vomica.

Is a valuable nervous stimulant, tonic, and bitter. Horses will eat it if mixed in their food. Strychnine is its active principle. *Dose,* ½ to 1 dr. once or twice a day.

Sulphur

Is useful in the form of sulphurous acid, for fumigating a building. The doors and windows should be closed, and four or five shovelfuls of burning coals should be placed inside it in convenient positions. On each shovelful of coal about ½ lb. of sulphur should be thrown. The fumes of the sulphurous acid should be allowed to fill the building for a few hours.

Tartar Emetic

Seems, when given *internally,* to stimulate the glands of the skin, the appearance of which it consequently improves. It is a very valuable worm medicine. It is also used to increase the action of aloes. Large quantities, administered internally, of an ounce or more daily for several days, have been borne with impunity. As a rule, about a quarter of a pound, given at one time, will kill a horse. *Dose,* 1 to 2 drachms daily in the food.

Turpentine

May be given internally, as an astringent, in one-ounce doses three times a day. For destroying worms in the intestines it should be given in full doses of, say, 4 oz. In doses of 2 oz. it is very useful in cases of flatulent colic. It should always be combined with linseed oil or gruel, so that it may not injure the mucous membrane of the mouth, gullet, etc. It is a very useful antiseptic (see page 172), and is a good application for ring-worm.

Vaseline.

For making up ointments, vaseline has the advantage of not being affected by the air. But for this purpose, it is not as good as lard; for its melting point is lower, and it is apt to spread and leave the agent, of which it is the vehicle, dry upon the surface of the skin. It is useful, by itself, in skin diseases.

Zinc.

White Lotion.

Sulphate of zinc . .	of each two drachms.
Acetate of lead . .	
Water	1 pint.

Is a useful application to wounds.

Zinc, Oxide of,

May be used in powder, as an astringent, for sores; or in the form of ointment (1 to 8 of lard) as an application for cracked heels, etc. It may be improved by adding 10 grains of benzoin to the ounce of lard.

Zinc, Sulphate of.

Two to four drachms of sulphate of zinc dissolved in a pint of water, forms a useful astringent lotion for wounds, etc.

CHAPTER XXII.

OPERATIONS.

IT would be impossible for an ordinary amateur, from simply reading this chapter, to perform some of the operations described. Horse owners, however, who are possessed of some practical knowledge, may, especially in India and the colonies, be placed in situations where it is most important for them to learn a certain amount of operative veterinary surgery: I trust, therefore, that the following pages may meet their requirements, and may prove useful for reference.

Backraking

Is the act of unloading the back part of the intestines. It is chiefly resorted to when the horse has been given physic without having been previously put on mash diet. Before performing this operation, the arm and back of the hand should be well oiled, and all unnecessary violence should be avoided.

Ball, Giving a.

The method for *preparing a horse for physic* has been described on page 512.

A ball is given as follows:—

The ball may be held between the four fingers of the right hand, the tips of the first and fourth being brought together below the second and third, which are placed on the upper side of the ball; the right hand is thus made as small as possible, so as to admit of ready insertion into the mouth. The left hand grasps the horse's tongue, gently pulls it out, and places it on that part of the right side of the lower jaw which is bare of teeth. The right hand carries the ball along the tongue and leaves it at the root. The moment the right hand is withdrawn, the tongue is released. This causes the ball to be brought still further back. The operator then closes the mouth and looks at the left side of the neck, in order that he may note the passage of the ball down the gullet. Many horses keep a ball in the mouth a considerable time before they will allow it to go down. A mouthful of water, or a handful of food, will generally make them swallow it readily. If this does not succeed, the horse's nostrils may be grasped by the hand and held for a few moments. A running halter should be used, so that the mouth may be quickly and securely closed.

If the operator has had but limited experience in giving balls, he should station an assistant on the near side to aid in opening and steadying the mouth, by placing the fingers of his left hand on the lower jaw, and the thumb of the right on the upper jaw. Holding the mouth in this manner facilitates the giving of the ball, and saves the operator's right hand, to a great extent, from becoming scratched by the horse's back teeth.

The balling iron is an instrument for keeping the mouth open. Its name appears to indicate that it is used for the purpose of giving balls, but it is rarely employed for that purpose; for the ball, before the instrument could be removed, would be liable to fall out of the mouth. It is very useful, however, when an examination of the mouth, or upper portion of the gullet or windpipe, is being made.

A mechanical balling iron has been introduced into practice. It is retained in the mouth by means of a headstall. It is ingeniously devised.

A *balling pistol* is useful for giving balls to fractious animals, to those with very small mouths, or to horses affected with some virulent disease, such as glanders.

Bandaging.

See pages 27, 31 and 32.

Bleeding.

In order to produce a general effect on the system, a horse may be bled from either the right or left branch of the jugular vein. These branches respectively lie in the groove which may be seen just above the windpipe on either side of the neck. If the vein be pressed by the points of the fingers, the portion of it which is above the part pressed, will become distended with blood, and the course of the vein will become clearly defined (see Fig. 19, page 209). A point about ten inches from the angle of the jaw may be selected as a convenient spot from which to bleed.

An assistant should hold the horse's head up, so that the vein and the skin which covers it should be somewhat stretched and pressed together. The horse should be placed in such a position that the vein will be clearly defined. He should be prevented from seeing the operation by blinkers; by a cloth attached to the headstall of the bridle; by the assistant placing his hand over the side on which he is bled; or by some other ready means.

As the branches of the carotid artery lie close under those of the jugular vein, it is safer to use the fleam in preference to the lancet for bleeding, unless a *guarded lancet*, made for the purpose, be employed.

The near side is the most convenient for a right-handed man, on which to bleed with the fleam. As blemishes, however, are less likely to be noticed on the off than on the near side, the former may be selected in the case of a valuable animal. The cutting portion of the fleam should be broad, so as to obtain rapid depletion, which produces a much better effect than when the operation is prolonged; the amount abstracted being the same in both cases. The blade should be clean, sharp, and smooth, so as not to injure the vein unnecessarily.

The spot having been selected, the skin immediately above it should be smoothed down with a damp sponge.

The operator should open the fleam so that its back should be at a little more than a right angle with the handle. He should hold the joint of the instrument with the tips of the index finger and thumb of his left hand, and should allow the handle to rest on the space between the finger and thumb. If there be a second assistant, he may press the vein, in order to make it more clearly defined; but if there be no one to help, the operator should, by pressing his fingers on the vein, assure himself of its exact position. Having ascertained this, he should place the cutting edge of the fleam in the centre and along the course of the vein, but not across it; for a transverse incision might destroy its continuity. He should then take the blood stick (which is purposely made short and heavy) in his right hand, should strike the back of the fleam a sharp measured blow with it, at a point just above the cutting edge. On removing the fleam, a jet of blood should flow out, if the operation has been properly done. If, however, the flow of blood be slight or altogether wanting, the non-success may be due, either to the vein not having been punctured, or to the opening in the skin not corresponding to that made in the vein, on the position of the head being shifted. The operator may satisfy himself on the first point, by compressing the vein a little below the incision; and, on the second point, by bringing the head back to the position it occupied when the fleam was struck. If the blow has been too light, although the fleam might have been held correctly, a second incision may be made at the same spot, or a little above or below it. It is the safer plan, however to make a second attempt on the other side.

When an opening is to be made in the right vein, the operator, before striking, may cause it to become distended by pressing it with the second, third, and fourth fingers of the left hand, while the index finger and thumb hold the fleam.

When the blood commences to flow, the part of the vein just below the incision should be pressed with the fingers in order to prevent the blood accumulating in the loose tissue underneath the skin. The movement of the horse's head should be restricted as much as possible.

The blood should be received into a measure, so that the amount abstracted may be ascertained at any moment. Care should be taken that the vessel which receives the blood does not press against the vein.

Bleeding to the extent of three or four quarts will be sufficient in ordinary cases.

When enough blood has been taken away from the animal, the operator should place a finger on the orifice, and should then, gradually, remove the fingers which were engaged in pressing the vein just below the incision. If this precaution be neglected, the horse will run the risk of being killed by a sudden rush of air into the vein on the compression ceasing abruptly.

In order to close the wound, the operator should press the edges together with the thumb and index finger of his left hand, taking care not to pull them towards himself, lest a tumour of infiltrated blood may form underneath the skin. He should also press the finger and thumb lightly against the neck, in order to steady the part. A pin, held in the fingers of the right hand, should be passed through the centre of the edges of the wound; and some cotton or tow should be wound round the ends of the pin in the form of a figure of 8, and knotted. The head of the pin is pushed down, and its point cut off so that it may not catch on anything. The pin may be removed after a week's time.

Blistering.

The hair should be closely clipped or shaved off the part to be blistered. The ointment should be rubbed into the skin for ten minutes or a quarter of an hour. The longer the rubbing is kept up, the greater will be the effect. The horse's head and tail, if they can reach the blistered spot, should be tied up. If the blister does not "rise" next day, some more of the application may be rubbed on, or the effect of a little friction with the hand may be tried. After two days, the part may be bathed with warm water, and some sweet oil smeared over it.

Mares "in season," horses inclined to dropsy, those which are in a debilitated state, or are shedding their coats, should not be blistered; for in such cases the part is apt to swell enormously, and its skin to slough. If these untoward symptoms ensue, a mild dose of physic—a pint of linseed oil for choice—may be given; or if the animal be weak, and is consequently in an unfit condition to stand purging, half an ounce of nitre may be mixed in his drinking water. A liniment composed of equal parts of Goulard's extract and sweet oil, may be applied to the part.

It is injudicious, in hot climates, to blister during the rainy season, or when east winds are blowing.

Casting a Horse.

The usual methods for casting a horse are: by ropes; and by hobbles. The former is best for castration, removal of scirrhous cord, and operations for hernia; as the hind legs can be kept wider apart by it than by the latter, which is more convenient for all other operations. A piece of soft old grass land is, in every respect, the most suitable place on which to cast a horse. A ploughed field, sandpit, or, failing these, a bed of straw may be used. With ropes, straw should not be generally employed, as it is impossible to tell within a few feet where the horse will fall; but with well-managed hobbles he should be made to drop on the very spot on which he had previously stood. The twitch should always be put on before the horse is cast. As horses are liable to fracture their backs in this operation, one should be very careful about casting animals, especially, old ones that appear stiff in their backs.

1. The *casting rope* should be thick, soft, and about 20 yards long. It should be provided with two metal eyes, at its centre, and about 30 inches apart one from

the other, so as to form pulleys for the rope. There are two ways for using these ropes: (*a*) the first method —one which has been suggested to me by Mr. G. A. Banham—is performed by knotting the rope, so as to make, at its centre, a loop which will fit, when passed over the animal's head, like a collar round the base of his neck. The knot is placed uppermost, in a line with his withers; while a rope, at each side, is passed backwards between his hind legs, brought round its respective pastern, and, then, passed through the eye of the improvised collar at its own side. The horse's head being steadied by a twitch, an assistant on each side pulls on the ropes, and, thereby, draws his hind legs from under him; when a push is all that is then needed to throw him on his side. An extra turn of rope is taken round the pasterns, so as to prevent the hind feet getting loose. The ropes are tightened and the animal fixed securely, with his hind legs drawn closely to his sides, and well separated, so as to freely expose his testicles and the under surface of his belly. If the loop of the rope presses unduly on his windpipe, it may be pulled away from that part, or the uppermost hind leg may be drawn forward, which will, also, relieve it. (*b*) By the second method, the loop is placed, as before, over the neck, but the knot rests on the breast-bone. This collar is prevented from slipping forward by a strap which is attached to the pad of a surcingle, or the rope may be platted into the mane, at the withers. The free ends of the rope are passed between the fore and hind legs, over the hind pasterns, are brought to the front, one on each side of his shoulders, and passed through the eyes on the loop. It is well to put bandages on the hind pasterns to prevent them being cut by the rope (see Fig. 31). The

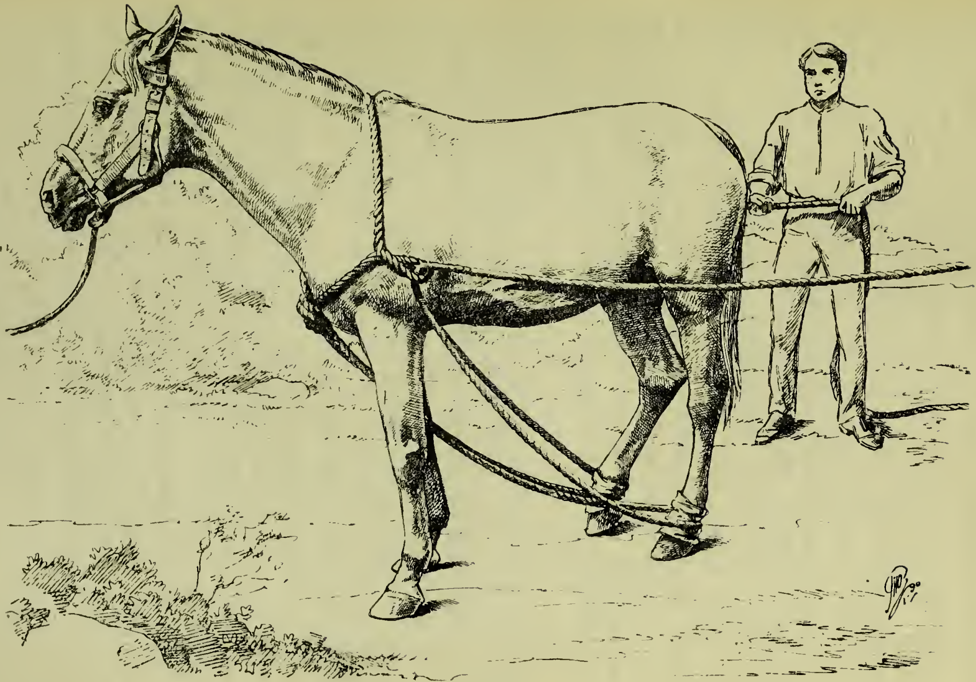


FIG. 31.

animal is, then, thrown and secured as before. A very much improved form of casting-rope is made by applying to each of the hind pasterns a "hobble" which buckles round the pastern and is provided with a pulley through which the rope (in this case a fairly thin one can be employed) of that side can work. There is, also, a pulley on each side of the collar, which is made to open, when required, by a spring hook. In all cases, when on the ground, the horse's head should be kept down, and his muzzle well extended. If, when using the casting-rope, we want to operate on one of the fore-legs, we may, after having thrown the animal, strap up the other fore-leg, by its pastern, to a surcingle which had previously been put on.

Care should be taken that the horse is not tied up too tightly, lest, during his endeavours to free himself, he may fracture one of the bones of his back or limbs.

2. *Hobbles*, in their simplest form, are four strong leather straps which are buckled on to the pasterns. Each of them is provided with an iron D for a rope or chain to pass through. One, called the "main hobble," has a larger D than the others.

To cast the horse on his right side, pass a loop of soft rope or webbing over the near fore leg, leaving the free end to hang over the animal's off shoulder. The main hobble is put on the near fore leg (or on the off fore if the horse has to fall on the near side), and the remaining three are put on the other legs, the buckles being to the outside. One end of a rope or chain is made fast to the D of the main hobble, its free end is passed through that of the hind leg on the same side, and so on until it returns through the D of the main hobble again. Two assistants hold this rope or chain, while one seizes that which passes over the shoulder. A steady pull on the hobble rope will bring all four feet together, and one on the shoulder rope will serve to throw the horse on his side.

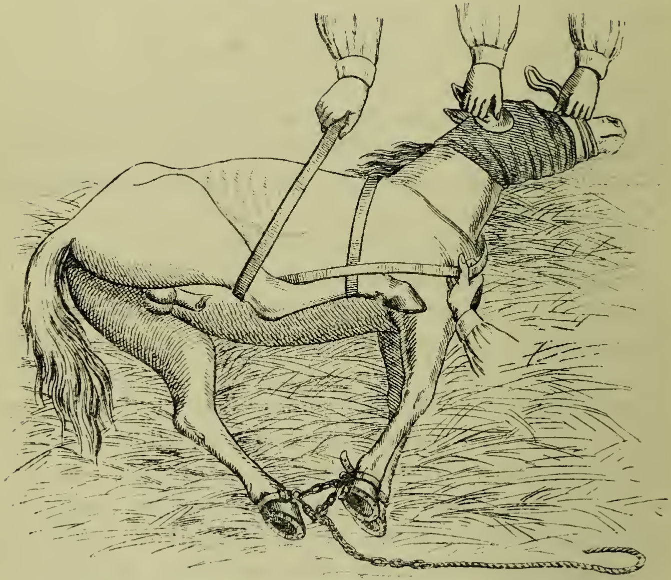
As horses are apt to injure themselves when being cast, by bounding forward and falling on their heads; it is well to attach, in the first instance, a rope or strong cord to the animal's tail; and have it held by an assistant, who, standing behind the horse, can thus prevent him from going forward. The cord can be fixed to the hair, if sufficiently long, by a "double sheet bend;" or to the dock, by a noose and a half hitch, both of which methods are fully described, with illustrations, in my *Illustrated Horse Breaking*. (Thacker and Co., London, and Thacker, Spink and Co., Calcutta).

We may release one foot, for an operation, by simply undoing the buckle of that hobble.

If, when the horse is on the ground, it is required, as for castration, to bring the uppermost hind foot forward, so as, for instance, to expose the testicles, a loop of soft rope or webbing should be placed over that leg just above the fetlock (see Fig. 32). The free end should be passed over the withers, underneath the base of the neck, and should be brought over the loop, and underneath and round the gaskin (just above the hock) of the uppermost hind leg. It should then be brought across the belly of the horse, in an obliquely forward direction, and should be held by an assistant. Another assistant should catch hold of this rope (so as to be able to pull on it) as it comes up from underneath the base of the neck.

Before the horse is cast, his eyes should be covered with some convenient cloth, or with leather eye guards made for the purpose. At the moment of throwing him, an assistant should stand at his head to steady it When the horse is on the ground an assistant should hold his head down, and should keep his muzzle well forward. It is, also, advisable to keep his tail straight out. The fact of having the column of bones from his nose to the end of his tail in as nearly a straight line as possible, will deprive him, to a great extent, of the power of struggling violently in this position, which, if he succeeded in doing, might not alone be inconvenient to the operator; but might, also, be the cause of the animal seriously hurting himself. The horse should not be fixed tightly; nor should any "back rope" be

FIG. 32.



From a drawing in Peuch and Toussaint's work.

used to bind him; lest he may, during his struggles, injure himself. A twitch is generally applied before he is cast. He should be kept fasting for five or six hours previous to being thrown.

An admirable plan for keeping a horse's head down after he has been cast, which I learned from Mr. Stephen Sparrow, M.R.C.V.S., Cambridge, is to place over his neck, a sack half filled with sand, and tied round its middle with cord. The sack, by its weight, will prevent the animal from raising his head off the ground; and, by its employment, the presence of one assistant at least, may be dispensed with. It is compressed at its middle, so that it may conform to the shape of the neck.

Castration.

Colts are usually castrated when about a year old; though, if they have a light crest, or are backward in condition, they may be given a few months, or even a year, more time. A foal generally has, at birth, his testicles in the scrotum. After a few months, they usually disappear into the abdomen, and redescend when the animal is about twelve months old. Under similar conditions, there seems to be as little danger in castrating an "aged" horse, as a colt; although the former is, of course, more liable to have his testicles or cord in a diseased condition, which might render the operation difficult, or unsafe. The only special ill result to an old animal is that the operation is apt to cause him to lose his spirit and pluck. Operating under chloroform is, however, likely to prevent this untoward contingency. Dr. Wilmott, M.R.C.V.S., remarks to me that a large experience has taught him that castrating an aged horse, without chloroform, is very apt to make him an inveterate shyer; but that the operation, when performed under chloroform, has no such tendency.

Colts intended for saddle and light harness work should be castrated earlier than those destined for heavy draught.

A horse should be in good health and condition before being "added to the list," and should be previously stinted of food for five or six hours, so that he may not injure himself internally when struggling.

In order that the wound may not take on an unhealthy action, one should not castrate during cold or damp weather, or when east winds are blowing.

With the view of avoiding blood poisoning, the operator should see that his instruments are scrupulously clean, and that the surroundings are free from bad odours or taint of any kind; and it would be advisable for him, before commencing, to wash his hands, knives, and clams in a solution of Jeyes' Fluid or carbolic acid in water—1 to 30. This application might be freely used over the wounded part. He should abstain from making the operation if he has recently been "calving" cows; making a *post-mortem;* or if he has been brought into contact with decomposing matters. My own practice is, before operating, to thoroughly wash and clean the instruments (chain of the écraseur, knife, etc.) and then to steep them for ten minutes in undiluted Jeyes' fluid or in common carbolic acid. These precautions are taken with special reference to the prevention of tetanus.

Before castrating a horse, he should be carefully examined for hernia, the presence of which will permit only of the covered operation being performed.

Methods of Castrating.—Those in ordinary use are as follows :—

1. *By the écraseur,* which appears to be the easiest, quickest, and safest method. The animal should be cast on his left side so as to allow the operator freedom to use his right hand. It is well to have a spare chain for the écraseur.

If hobbles are used, the horse should be thrown on his left side, and his off hind leg should be drawn forward in the manner described on page 543. The left testicle is taken in the left hand, and its base is squeezed, between the thumb and finger, so as to tighten the skin over it. If there be difficulty in catching hold of the testicle, the right hand may be used to aid the left. French veterinary surgeons advise that, in such a case, an assistant should lightly tap the muzzle of the horse with a switch or whip, so as to distract his attention, or he may be put slightly under the influence of chloroform. To overcome the action of the cremaster muscle, we should push the testicle forward, but not draw it back. The left testicle being held in the left hand, fingers pointing to the rear, the operator may make, with a sharp and suitable knife, a bold cut, parallel to the middle line, of about four inches in length, through the skin and coverings of the testicle, which ought to spring out through the opening thus effected. While making the cut, the operator may steady his hand by keeping the tip of the thumb on the testicle. If the incision does not prove deep or long enough, a second or third one may be made. The cut should be well forward, and as close as possible to the sheath without injuring it, so that any subsequent discharge may readily drain off. It does not very much signify if the testicle be wounded. I may here observe that the testicle in its natural state is covered by skin and by an inner coat (*peritoneum*) the surface of which, next the testicle, is smooth and glistening, it being a serous membrane. This serous pouch in which the testicle lies, contains, in health, a greater or less quantity of watery fluid, which may squirt out, when the incision is made. We may find, as a result of previous inflammation, the testicle adhering to its covering of peritoneum, which, in such a case, will have lost its serous character, and will have become fibrous. If, on opening the scrotum, hernia be observed to be present, the covered operation should be performed. It may happen, especially, in the case of old horses, that, owing to previous inflammation, the testicle adheres to the scrotum, and will not easily come out. If this occurs, the adhesions should be broken down by the fingers, or they may be carefully dissected away by any convenient blunt instrument. When handling the testicle we shall find as a rule, that it is at times strongly retracted towards the abdomen by the cremaster muscle, the tendon of which we shall be able to distinguish, at the posterior part of the testicle, by its rigidity. We should divide this tendon by a touch of the knife. We may also, without danger of causing bleeding, cut away some of the bloodless portion of the cord at its posterior border, so as to clear the testicle for removal. I may mention that the important blood vessels of the cord are in front. We may now slip the chain of the écraseur over the testicle, and bringing it well down on the cord, wind it up by the handle, until the cord is severed. Care should be taken that the cord is not pulled upon in any way during the struggles of the animal. Having screwed up the écraseur to its full extent, we may find that the cord is not altogether severed; in which case, instead of pulling at the chain, it is safest to twist the testicle round and round with the hand, until it comes off. Having removed the other testicle in a similar manner, we may wash out the cavity freely with water, and then with a solution in water of corrosive sublimate (5 grains to the pint), Jeyes' Fluid or carbolic acid (¾ oz. to the pint), or boracic acid as much as will dissolve in the water. The animal may now be allowed to get up, and may be kept on light and green food for a week. The wound, to keep off flies, may be smeared over, from time to time, with an ointment composed of Jeyes' Fluid or carbolic acid and vaseline (1 to 30), powdered aloes and lard or vaseline, or turpentine and lard (1 to 4). Or the wound may be syringed out, every now and then, with a solution (1 to 30) of either Jeyes' Fluid or carbolic acid.

After this operation, there is generally a little bleeding, which will soon stop of its own accord.

2. *By the Hot Iron.* The procedure by this method is the same as already described, up to the putting on of the chain, instead of which a clam is passed underneath the testicle and around the cord, close up to the belly. It is now secured by a ring which passes over its handles, by a ratchet, or by a screw, the first being the simplest plan, though the third is probably the most efficient.

The clam is an instrument used for compressing the cord. It is composed of two pieces of flat steel, having serrated edges and united by a joint. The ends away from the joint are formed into handles. The clam should be made extra broad if it is to be used with the hot iron; in order that it may save the thigh from being burned.

If we cannot obtain a broad clam, the scrotum and the inside of the thigh should be protected from the heat by covering them with wet cloths. The operator should take a red-hot firing iron, which should be clean and free from all scales, and should burn through the cord and surrounding tissues at a distance of about half an inch above the clam. The iron should be freely applied to the cut end of the cord, so as to prevent any chance of bleeding. The clam is now gradually relaxed. The hot iron should be reapplied in the event of bleeding ensuing before the clam is finally removed. The right testicle is treated in a similar manner. After the cord is severed, the finger should be introduced into the wound, and the end of the cord freed from any adhesions which may exist between the cord and scrotum.

If after the operation, excessive bleeding takes place, treat as directed on page 206.

3. *By Twisting.* After the clam has been applied, and after the non-vascular (the posterior) portion of the cord has been divided with a knife, the testicle is simply twisted off by means of a torsion forceps, which is specially made for the purpose. If the operator be unprovided with this instrument, he may catch hold of the uncovered testicle with his hand, and slowly twist it round and round, until the surrounding tissues, cord and vessels, gradually give way. It is well to divide the nerve before applying the torsion forceps.

The great advantage of the torsion method is that it obviates nearly all possibility of bleeding, which frequently follows castration by the hot iron, and is naturally alarming to an inexperienced operator.

The advocates of the hot iron maintain that it is safer than torsion, which, they say, is apt to induce tetanus. I am not at all satisfied that there is not some truth in this assertion, especially when it is made with reference to castration in tropical climates.

The operation with the hot iron, may, on the contrary, give rise, in a few rare cases, to scirrhous cord, especially when the cord has not been severed high enough up.

4. *The covered operation,* which should be adopted only when hernia is present, may be performed in the manner recommended by Professor Williams, by including the scrotum and its contents, upon the side of the hernia—after returning the intestine into the abdomen—in a strong wooden clam as close as possible to the belly, and letting it remain on until the testicle sloughs off; or, we may remove it with the knife after a couple of days.

It is good practice to keep colts under cover for ten days after castration. The scrotum should be bathed on the third day with warm water, to which a fortieth part of carbolic acid has been added. The wound should be opened up with the finger to allow free escape to any discharge. It is not necessary to do this more than once, unless the scrotum and sheath are very much swollen, when it may have to be repeated. A liberal supply of soft diet, residence in a clean, airy box, and judicious exercise greatly facilitate recovery. Mountain ponies in Scotland are usually turned out immediately after the operation. Casualties on account of this practice are rare.

For unfavourable results of castration, such as Peritonitis, Bleeding, Scirrhous cord, and Tetanus, see pages 206, 207 and 450.

Catheter, passing the.

The *male catheter* is a long, flexible tube of somewhat smaller diameter than the urethra—the canal by which the urine escapes from the bladder—and is used to draw off the urine when the animal is unable to stale. It is provided with a whalebone stillet to give it rigidity.

The horse should be backraked previous to the operation. If the catheter is to be passed while he is standing up, his two hind legs may be hobbled together, a fore-leg held up, and a twitch applied to his upper lip.

An assistant should draw out the head of the penis from the sheath. If he finds difficulty in inserting his hand, he should oil or grease the back of it. The operator, standing on the right side of the animal, and having oiled the point of the catheter, should introduce it carefully into the urethra (see Fig. 30, page 266), and should pass the catheter, containing the stillet, gently upwards until its point arrives at the bend which the urethra makes before it enters the bladder. The catheter may be felt, by the finger, on the median line directly underneath the anus. When the point of the catheter arrives at the bony prominence just below that part, the stillet should be withdrawn, and the operator should place his fingers on the point of the catheter, so as to depress it, and to cause it to enter the bladder. He should introduce his hand into the rectum, if necessary. While he is thus guiding the catheter, the assistant should push it upwards, taking care to avoid any roughness in so doing.

The *female catheter* is a tube of similar material to the instrument used for horses. It is about a foot long, and is not provided with a stillet.

The orifice of the urethra in the mare is situated on the floor of the vulva and four or five inches within the external opening, and is guarded by a large mucous valve which points in a backward direction. The female urethra is wider than that of the horse, and is very short. The urinary valve should be lifted up by the point of the right index finger, and the catheter having been well oiled, should be gently pushed onward until it enters the urethra. The urine contained in the bladder will then find a ready escape.

When the bladder has been distended for any length of time, it may become partially paralyzed. It is good practice, therefore, both with the horse and with the mare, to keep the right hand in the rectum, and to aid evacuation by pressing on the bladder.

Chloroform, Giving.

It takes from 1½ to 4 oz. of chloroform to render a horse insensible.

In giving chloroform, we should note the state of the breathing, and not that of the pulse; for according to the Hyderabad Chloroform Commission, "the heart's action never becomes dangerously affected or stopped until after cessation of respiration." We also learn from the labours of this Commission, that it is well, at first, to give the vapour in a concentrated form and in a full amount; for the more rapidly the condition of insensibility is brought on, the more quickly will the return to consciousness be re-established. As soon as the animal is rendered insensible, only sufficient of the vapour should be given to keep him under its influence.

One man should be specially appointed to give the chloroform. The horse should, as a rule, be cast previous to the operation, and the chloroform given by a specially made muzzle, or one of wire net-work, inside of which pledgets of tow, saturated with the drug may be placed. The chloroform should be renewed according as it evaporates. Or a towel may be folded in the form of a cup, and a little cotton wool may be placed in its centre to receive the chloroform, which should be poured out, a little at a time, care being taken to replace the stopper in the bottle without delay. The horse being kept with his head resting on the ground, may be made to inhale the fumes through his upper nostril, while the lower one may be kept more or less completely closed by the hand, which should be instantly removed, for the moment, if symptoms of suffocation become apparent. The amount of influence which the chloroform has on the animal, may be accurately ascertained by noting the degree of insensibility his eye manifests when touched with the finger. The operation being over, cold water should be freely dashed over his head and face in order to restore him to consciousness. See page 469.

Clysters (enemas), Giving.

There is no doubt but that an enema given in the ordinary way is almost useless; as the injected fluid does not penetrate more than four or five feet into the bowel. The best form of enema tube is that devised by Mr. Fred Smith, F.R.C.V.S. It is 6 ft. long, and may be used with Read's enema syringe. Mr. Smith remarks that " there is no difficulty in passing it; having been oiled, with gentle pressure, it finds its way along the course of the rectum, and when it refuses to go further, no force should be used; all that is required, should it be necessary to pass it further forward, is to pump in a gallon or two of water, which dilates the bowel in front of it, and the passage is accomplished."

Water for injections should be but little warmer than the temperature of the body, say, not more than 103° F. It should not be mixed with soap or any other addition.

An assistant holds up the near fore-foot. The operator having filled the clyster pipe and oiled its nozzle, inserts it, very gently, into the anus. The fluid is then injected.

Destroying a Horse.

The readiest and most humane way to kill a horse, is to shoot him in the middle line of the forehead, about four or five inches above the level of the eyes. The weapon should be held close up to the forehead, and at right angles to it. If this be done, the animal will drop down, without a struggle, on the spot upon which he had been standing.

Drenching.

When giving a drench, the horse's head should be raised so that the line of his teeth should be horizontal, or but very slightly inclining upwards. If he be quiet, an assistant on the near side may be able to hold his head up with his hands; but if he be fractious, his head should be kept in position by means of a loop or cord of sufficient length passed under his upper jaw, and resting on the palate at the space which is bare of teeth (the interdental space). It is convenient to run one of the prongs of a stable fork through the upper end of the loop, while the handle is steadied by an assistant. It is better, however, to have a staff, with a loop of cord passed through it at one end, made for the purpose, than to employ any sharp-pointed instrument near the animal at a moment when he may be apt to struggle.

The person who gives the drench should stand on the off side, and should introduce the bottle, or other vessel which holds the medicine, into the mouth just in front of the grinders, at the space which is bare of teeth, and should direct it well back. Only a little at a time should be given, say, one or two wine-glasses full, and ample time should be allowed the horse to swallow the fluid. If he make the slightest effort to cough, his head should be instantly lowered, lest he may become choked. His tongue should on no account be drawn out of his mouth and held; nor should his nostrils be grasped with the hand, as a sudden gasp for breath, might carry the fluid into the wind-pipe, and, consequently, set up inflammation of the lungs.

The mouth of the drenching vessel should be broad, so that the fluid may readily escape. An ordinary glass bottle is bad, as its neck is narrow, and it is apt to break and hurt the mouth, unless it be covered with leather. A wide and smooth-mouthed block tin vessel, containing about a pint and a half, may be made for the purpose.

"Enemas, Giving."

See "Clysters, Giving."

Firing

Is the application of a hot iron to the skin.

It is surprising how few horses require to be cast for firing. With good assistants, and a little patience, 80 per cent. may be fired extensively while standing, which is much the more preferable attitude, as the operator can then ensure the regularity of the lines drawn. It is impossible, when the horse is on the ground, to accurately allow for the alteration in position which the skin will have undergone when he will have regained his feet. Holding up one fore-leg and applying a twitch will generally be sufficient for control.

I trust none of my readers will be guilty of the not uncommon barbarism of firing a horse "all round;" of firing a sound leg to make him "stand level," when an unsound leg has to be operated upon; or of firing a sound limb as a preservative measure. The precautions, as regards health and climate, which should be observed before blistering, equally apply to firing. See page 538.

There are two forms of firing,—(1) by lines; (2) by puncture. For the first method, the ordinary wedge-shaped firing iron may be used. It is pointed, and has a convex and moderately sharp cutting surface, which is about 3½ inches in extent. Cast steel irons are the best, as they are not apt to "scale." It is well to employ a double iron, which consists of two ordinary irons welded together, so as to have their edges parallel and at a distance of about half an inch from each other. By using this, we can ensure that all the lines shall be exactly the same distance apart. After the double iron has done the scoring, the lines may be gone over again with the single one. Generally, the operator should have a couple of spare irons heating, while he is firing with the one in use. If an iron is rusty, or has scales on it, it should be filed clean before being employed.

The hair should be closely clipped off the part to be fired. The iron should be used at a bright red heat. In order to render the subsequent blemish as little as possible, it is generally advisable, when firing the legs, to draw horizontal lines, which should be about ½ an inch apart. If a blemish is of no consequence, the iron may be passed almost through the skin, in which case, the lines should be a little wider apart. Care should be taken, at parts where there is flexion, such as the front of the hock and back of the knee, not to fire too deeply, lest a troublesome wound might be produced. Firing by lines is the most convenient method for sprains of the back tendons, curbs, ring-bones, side bones, and thorough-pins. The skin should, on no account, be fired in a series of crossed lines; for the isolated portions of skin will be very apt to slough, from having been deprived of their proper blood supply. Many good veterinary surgeons consider it sound practice to rub in a blister immediately after firing. I am inclined to this opinion myself; although I am unable to advance any strong argument in its favour.

For *puncture firing*, a pear-shaped iron with an elongated point, may be employed. This form is very useful for splints and spavins. *Pyro-puncture* is preferable for structures like the hip and stifle, which are covered with loose skin. It is performed by means of a plate about 3 inches square, and having 9 to 12 pointed studs fixed into it.

Fomenting.

A fomentation is, strictly speaking, the application to the skin of flannel or other material which has been soaked in warm water. In stable parlance, bathing any part with warm water is also called "fomenting."

Fomentations, over large surfaces, are best applied by dipping a blanket or other woollen cloth in hot water, wringing it moderately dry, applying it to the part, and then covering it with a waterproof sheet or dry blanket. When the underneath blanket loses the most of its heat, it should be changed for another, care being taken that the animal does not get chilled during the interval. The fomentations should not be hotter than the hand can comfortably bear.

Hand-rubbing.

Although the practice of massage, which is the fashionable name for shampooing, has been in vogue for centuries in the East, it has only within the last few years been adopted as a curative agent by European doctors. It is now justly held in high repute, especially for injuries and diseases of the joints and for rheumatism. As regards the principle by which massage acts, we must remember that repair of injury and removal of diseased products from a part, are effected by the circulation, which is stimulated by properly applied manipulation. Massage is not alone of immense use as a curative means, but is also very beneficial in improving the general health, particularly of those whose circulation is torpid. We see the truth of this exemplified in horses, by good grooming, which should be chiefly performed by the palm of the hand and the flat of the arm from the wrist to the elbow.

When doctors have an injured part massaged, they are careful to get the work done *towards* the heart; for that is the direction in which the contents of the veins and lymphatics flow. These vessels remove exudations away from a part; while the arteries are employed in bringing blood to it. Hence, it appears that the method of hand-rubbing horses' legs, as practised in the usual manner, is altogether wrong; for the mechanical manipulation is performed in a direction opposite to the flow of the venous blood and lymph. To do it properly, we should work from the fetlock to the knee, and not from the knee to the fetlock. The only practical objection to this would be that the direction in which the hair of the part lies, would be opposed to the movements of the hands. This might easily be got over by having the hair cut short, and also by keeping it oiled when hand-rubbing. In practice I have found the best results from the following method of hand-rubbing the ligaments and tendons of the leg below the knee and hock. Have, for instance, the fore-leg taken up and held by an assistant, or suspended from a roller or surcingle by a strap going round the fetlock. We may begin with the skin, a fold of which "should be pinched up between the thumb and fore-finger and lightly twisted so as to give no pain" (*Hale White*); and we may afterwards proceed to manipulate the back tendons and suspensory ligaments with the entire hand. The fact of these structures and the skin that covers them being thoroughly relaxed by the knee and fetlock being bent, will greatly facilitate the operation. This working of the part should, as I have before pointed out, be performed in an upward, and not a downward, direction.

Neurotomy.

Though signifying the division of any nerve, this term is usually applied to the operation by which the foot is deprived of sensation.

The nerves which endow the horse's foot with the power of feeling, pass down each side of the leg, just in front of the perforans tendon (see Fig. 1), immediately above the fetlock joint. The nerves on each side are about the thickness of an ordinary piece of twine, and are white, tough, and fibrous in appearance. They are accompanied by a vein and artery, the former being in front, while the latter is usually in the middle. The word *van* furnishes us with a useful *aide-mémoire* by which to remember how these structures lie. Their relative position, however, is not invariably constant.

Neurotomy as affecting a Horse's Usefulness.— "That the tactile sense in the horse's foot is useful, it would be idle to deny; but that it is absolutely essential even to safe progression, no one who has paid attention to the results of plantar neurotomy will maintain. On several occasions, for years I have hunted, hacked, and driven horses which had been deprived of sensation in their fore-feet, and never had an accident with them. Their action has not been impaired by the operation; on the contrary, it was vastly improved, compared with what it had been previous to it. And my experience has not been singular in this respect, as many competent horsemen can give like evidence after long and severe trials of neurotomised horses. The opponents of neurotomy were probably not aware that there is in progression a *muscular* as well as a *tactile* sense." (*Fleming.*)

Indications and Unfavourable Results.—" The effects of neurotomy are certain and durable when it is employed at the commencement of navicular disease, and when the ailment is confined to one foot. It can be easily imagined that it is impossible for the operation to be successful, when the navicular bone and tendon are destroyed by ulceration." (*Peuch and Toussaint.*)

The same authors strongly recommend the operation in cases of chronic lameness from sidebones; ringbones, except when they are accompanied by bony union of the joint; chronic laminitis; injuries to the hoof, which may have caused a bony formation on the coffin bone, or may have had the effect of increasing, to an abnormal extent, the local growth of the inner horn of the hoof, constant pain from pressure being the result in either case; or from surgical operations on the foot. English veterinarians, on the contrary, consider that horses whose feet have a predisposition to laminitis should not be "un-nerved." Such feet are naturally flat, and have weak soles and heels.

It is probable that inflammatory action is less liable to be excited in the neurotomised foot than in the sound one.

It is evident that good results from this operation, can be confidently expected only when it is performed during an early stage of a foot disease for which it is applicable.

As the "un-nerved" horse when being shod, will always run the risk of being pricked without the owner or attendant becoming aware of it, until most serious results manifest themselves, the operation is more suitable in countries where horses can be worked barefoot, than in those where all animals require to be shod. Softening of the back tendons and sloughing off of the hoof are two formidable accidents which may happen as results of neurotomy. They are more liable to follow the high operation than the low one. It is commonly supposed that these complications are due to the deprivation of nervous influence which the foot has undergone. M. H. Bouley argues against this view, and advances the facts that after this operation the wound heals in a perfectly healthy manner, and that the secretion of horn does not appear to be affected in the slightest. M. Chauveau divided all the nerves of the limbs without causing any interference with their nutrition. M. H. Bouley considers that these accidents are due to increased concussion of the hoof with the ground, owing to the foot having lost its feeling, and adds that "in general the effects of neurotomy are much more efficacious and durable in the case of horses used for slow work, than in those of animals which are employed at fast paces."

It appears from the foregoing coniderations that the reason why neurotomy of both feet is so much more liable to be followed by unfavourable complications than that of a single foot, is that, in the former case, the horse is without any indication to guide him in regulating the amount of concussion which his feet can safely bear, and is, consequently, liable to knock them about unnecessarily; while in the latter we find, from the fact of his going "level," that he does not (accidents excepted) put more weight on the "unnerved" foot than he does on the one whose sense of feeling is intact.

The Operation.—In order to effect a rapid healing of the wound, and to diminish, as much as possible, the subsequent scar, the operator should strictly adopt, as regards his hands, instruments, and the skin of the part, the antiseptic precautions described on page 169. Mr. Fred. Smith advises the employment of Esmarch's bandage, which consists of a long elastic bandage that is rolled tightly round the foot from below, upwards, and when it has gone a convenient distance above the fetlock, it is unrolled from below, upwards, so as to form a tight compress by means of which the blood that has been driven out of the pastern and fetlock in front of the bandage is prevented for the time being from returning into the part. This bandage, with *tourniquet*, can be obtained, made for the purpose, from Messrs. Arnold and Sons, West Smithfield, London. Its use is of course to keep the part in a bloodless condition, so as to facilitate the finding of the nerve, and with that object will be a great assistance to inexperienced operators who are apt to become confused by a continued flow of blood. To anyone who is at all conversant with the anatomy of the part and who has a fair amount of self-possession, this aid is in no way essential to success, for the discovery of the nerve to such a one is a very easy matter.

After casting the horse with the hobbles on the right side, if the operation has to be performed on a right foot, and *vice versâ,* we remove the foot from its hobble and draw it forward by means of a noose of stout webbing or cord passed over its pastern to steady it. The nerve on the inside of the leg is the one which should be the first divided; because the wound will then escape contact with the ground or bedding. An incision of about half an inch long, above and just clear of the fetlock joint, and immediately over the front edge of the back tendons, is all that is required.

The readiest method of making the incision is to pinch up between the fingers a fold of skin immediately above the fetlock, so that it may lie across the course of the nerve. An incision about half an inch in length should now be made with a pair of rowelling scissors, as suggested by Dr. Fleming, across this fold of skin, in the direction of the length of the leg, and over the course of the nerve which will thus become exposed to view, or may be found with very little trouble. As the horse which is not under the influence of chloroform, will make a violent backward movement with his leg on the snip being given with the scissors, the operator should work from the front.

The shape of the rowelling scissors, with its powerful leverage and curved-in points, will greatly facilitate the making of the incision. If the animal be under the influence of chloroform, the knife, which is certainly the neater weapon of the two, may be employed. I have seen such disastrous results from the use of the knife, even in professional hands, that I would deprecate its employment at this stage of the operation, or when freeing the nerve from its surrounding connective tissue, unless the patient has been rendered insensible by some narcotic.

The incision through the skin having been made, we may expose the nerve, which may not at first be visible, by tearing away the loose overlying tissue by means of some blunt instrument like the point of a pin director or of a dissecting forceps. This tissue readily gives way, and no risk is run, in the event of the animal struggling, of wounding the artery or vein, either of which eventualities would by a copious rush of blood greatly interfere with the operation. The nerve should not alone be exposed as much as the length of the incision through the skin will allow it to be done; but should also be freed from any attachment on its under side, by passing the instrument, whichever one be used, under the nerve.

The vein being dark in colour may be easily distinguished from the artery and nerve, the difference between which is not so readily seen. The former is larger than the latter, and is more "yielding" when pressed by the forceps. Its "throbbing," also, will indicate the circulation of blood through it. The nerve, when cleared of its surrounding connective tissue, looks white, shows longitudinal fibres, feels hard, and is extremely sensitive when the animal is not under the influence of chloroform. The operator having dissected the nerve clear of any loose tissue, may pass a curved suture needle, armed with thick thread, under it; in doing which the pin director will come in handy. The thread should now be knotted in a loop and the needle cut off. The nerve, by means of the thread may be pulled out, and divided *as high as possible*, with a sharp, narrow knife. This snip will, naturally, inflict intense, though only momentary pain on the animal. Sensation being now destroyed, the horse will cease the struggles he had made, up to this, whenever the nerve was touched. The free end is pulled out of the wound, and as much of the nerve is cut off at the lower end of the incision as the operator can get at. Unless at least an inch in length of the nerve is removed, sensation may become re-established after a few months by nervous union taking place between the cut ends. The horse should now be turned over, and the operation performed on the outside. The object of drawing the nerve out is to prevent the cut ends from becoming involved in the healing of the external wound.

I may mention that the fact of the part having been previously blistered, greatly increases the thickness of the skin and underlying tissue, and adds to the blood-supply in them.

Any blood, the presence of which might impede the work, may be "sopped" up with a piece of antiseptic cotton wool. Were we certain that the wound has escaped all contamination from contact with unclean hands, instruments, bedding, etc., it would be best to dress it *dry*. But as strict antiseptic precautions are all but impossible to be obtained in such an operation in horse practice, it is well to apply some suitable antiseptic such as 5 grains each of corrosive sublimate and common salt, water, 1 pint; or Jeyes' Fluid, $\frac{3}{4}$ oz. and water, 1 pint. The wound may be closed by a stitch of carbolised catgut or suture wire. After the horse has been allowed to regain his feet, the blood issuing from the wound should be "sopped up" as before, with antiseptic lint, and when it has stopped flowing, the antiseptic may be again put on and then a thick covering of antiseptic (*e.g.*, salicylic acid, corrosive sublimate or boracic acid) cotton wool, which may be kept in its place by eight or ten layers of corrosive sublimate gauze rolled round the leg. We may apply over the whole, gutta-percha tissue, so as to effectually exclude the air. This dry dressing may be left on for a week, after which time the wound ought to have healed up with but a slight scar.

The employment of chloroform naturally renders the operation easier for an inexperienced operator, and less painful for the horse.

"When neurotomy of both forefeet is indicated, it is prudent to allow a few days' interval to elapse after the operation in one leg, before performing on the other." (*Peuch and Toussaint.*)

After "unnerving" a foot, special care should be taken, for a couple of months at least, not to subject it to violent concussion, and great attention should be devoted to its shoeing and general management.

In the event of fracture of the navicular bone, after neurotomy, there is elevation of the toe of the foot which does not occur in cases that have not been operated upon. Such a fracture not unfrequently happens when the bone has suffered, for a long time, from navicular disease.

After neurotomy, there is, generally, increase o growth of horn, on account of the division of the sensory nerves causing dilatation of the blood-vessels, and, also, by reason of the animal bringing the foot more into use.

Periosteotomy.

See page 142.

Pulse, Feeling the.

The pulse is usually taken at the *lower jaw*, its character, there, being better marked than at other convenient situations. The artery (submaxillary) may be felt underneath the lower jaw, a little in front of the fleshy part of the cheek. On passing the fingers of the hand over the spot, two vessels can be distinguished lying closely together; one, the duct which conveys saliva from the parotid gland into the mouth; the other, the artery (the facial) which mainly supplies the face with blood. The middle finger should be applied so as to gently press the artery against the inner surface of the bone. The ball of the thumb should not be placed on the outside of the jaw, lest the pulsation of the artery of the operator's thumb might confuse him.

The following description of observing the pulse at other places, has been kindly placed at my disposal by Professor Vaughan, late of the New Veterinary College, Edinburgh.

The pulse at the *sub-zygomatic artery*, which is the easiest of all to feel, may be taken by placing the pad of the middle finger gently on the horse's cheek, a little in front of the posterior edge of the lower jaw-bone, and about an inch below its joint. The proper spot is about 4 inches below the ear.

Very frequently the indication of the *artery of the fore-arm* (the posterior radial) is the one adopted. This vessel is on the inner side of the fore-arm, and may be felt by inserting the hand, from the front, between the breast and fore-arm, and feeling for the slightly prominent head of the bone (radius) just below the elbow joint. The place is described anatomically as being situated just behind the insertion of the flexor brachii muscle. Care should be taken, as the artery is but loosely attached, not to push it out of position when searching for it with the fingers.

Below the hock, we may take the pulse of the artery (the great metatarsal) which runs down the groove between the cannon-bone and the *outer* splint-bone, by gently pressing the finger on the upper third of this groove.

The *middle coccygeal artery*, which occupies the groove running along the inferior aspect of the tail, will also afford an indication of the pulse. It should be felt for tolerably near the body.

The rate per minute of the pulse of heavy cart-horses is about 35, of well-bred horses about 40, and of small ponies about 45. The younger the animal, the quicker the pulse.

Puncture of the Intestine for Flatulent Colic.

This operation is performed by means of a trocar and cannula. The latter is a metal tube which forms a sheath for the former, and is about 1-5th of an inch in diameter and 6 inches long. The trocar is a steel, triangular-pointed rod, which fits into the cannula, and is provided with a handle to facilitate its insertion into, and withdrawal from the bowel.

The operation is performed in order to give vent to gas which has accumulated in the intestine during an attack of flatulent colic. Very little risk attends it when done under favourable conditions. The veterinary surgeon may place his hand up the rectum to find out where the gas has chiefly accumulated, and where he ought, consequently, to drive the instrument.

The puncture should be made if the symptoms do not become relieved by the medicine given, but it should on no account be delayed until the horse becomes exhausted, lest fatal complications, such as choking, or rupture of the stomach or intestines, may ensue.

The best place to make the puncture is on the right flank, at a spot equidistant from the point of the hip (anterior iliac spine), the end of the last rib, and the side processes of the vertebræ of the loins (see Fig. 20). If the first puncture, owing to blocking up of the cannula, to its being too short, or to the intestines being filled with solid matter, does not succeed, we may repeat the operation a little above or below the first puncture, on the left side, or where we perceive the accumulation of gas to be greatest. Many authorities agree that the puncture may be made without danger on the left side.

In order to injure the intestines as little as possible, and to prevent the chance of particles of food getting into the abdominal cavity, and thus setting up peritonitis, we should use an instrument of small diameter: with such a one the operation is perfectly safe, on either side.

For securing the animal, it is generally sufficient to tie up one fore-leg, and to apply the twitch; in fact, these precautions are not always necessary. One ought, if possible, to take the opportunity of making the puncture when the animal is lying down. One should carefully guard against the chance of injury to the horse, while the puncture is being made, from his throwing himself about when suddenly seized with colicky pains. In a few cases, the animal may be kept lying down by means of hobbles.

The operation itself is a very simple affair. The operator, having placed himself on the right side of the horse, should make an incision through the skin with the knife, at the point chosen, of a little less than half an inch in length, in order to allow the trocar to penetrate easily, and to prevent air getting into the loose tissue underneath the skin. Then, while holding the trocar with his left hand, he should place its point perpendicularly into the incision, and should strike the handle of the instrument a sharp blow with the palm of the right hand, so as to make it penetrate into the intestine. The gas escapes with violence on the trocar being withdrawn out of the cannula. In proportion as the gas escapes so does the inflation of the intestines diminish. One should take care to press the cannula as far as it will go, so that it may penetrate into the intestine, and may not remain between it and the flank. If the evolution of gas stops suddenly, on account of the cannula becoming obstructed, the instrument may be mopped out by means of a small metallic stem prepared for that purpose, but not with the trocar, which might wound the intestine. If these means do not succeed, a second puncture, some distance from the first one, may be made.

The cannula should be kept in until the gas ceases to escape and the inflation has nearly disappeared. It is always prudent not to leave the instrument longer in than a quarter of an hour, so as to avoid, in some measure at least, the chance of peritonitis. Some practitioners take it out after five or six minutes, if the evolution of gas has ceased by that time. Another objection against allowing the cannula to remain long in, is that it might wound the intestine during the struggles of the animal, or on the collapsing of the bowel.

To remove the cannula, one should seize it with the right hand, and should raise it rapidly, but without roughness.

There is no need to do anything to the external wound, as the puncture becomes closed up by reason of the hole, which was made through the skin, shifting its position away from that made through the abdominal muscles, on the swelling going down.

The practice of injecting medicines through the cannula is very dangerous, as the fluid might go the wrong way, and escape into the abdominal cavity, with the very probable result of peritonitis and death. It is much better to give a drench in the ordinary manner.

Setons

Are pieces of tape which are passed into various tissues in order to set up irritation in the part, and, consequently, to draw an increased supply of blood for the repair of some neighbouring diseased or injured structure. The best kind of tape is broad white linen tape, or, in its absence, as broad a strip of calico as the needle will take. A seton needle is a very large, flat, steel needle made for inserting the tape. Those used about a joint, such as the hock, should have the point blunt, in order to prevent injury to the capsular ligament, while the sides are left sharp. Rowelling scissors should be used to cut through the skin at the points for insertion and exit of the seton needle. A handle, to which the needle may be fixed, is employed to force the point through deep-lying, or hard tissues. When the tape is passed through the part, its ends may be tied together, or knotted separately, an inch or two being left over, while the extra lengths are cut off. The tape, as long as it remains in the part, should be pulled backwards and forwards a little, once or twice every day, so as to keep up a continued state of irritation. Before being inserted, it is sometimes smeared over with blistering ointment, in order to increase the irritation. The object of the seton will, usually, be accomplished, when free suppuration has been set up, which will be in five or six days. A seton should not be allowed to remain longer than ten or twelve days in any part in which a subsequent blemish would be a matter of consequence.

Slinging

Is the employment of means for resting a horse when it is indispensable that he should be kept standing, or when he is unable to lie down. In the absence of properly made slings, a good substitute may be obtained by taking a sheet of thick canvas, such as a strong sack, which will suit admirably as regards size, and is generally available. Each end is turned over and sewn firmly on to a piece of wood about the substance of a stable-fork handle. This impromptu sling being passed under the horse's belly, ropes are attached to the four free ends of the pieces of wood, and are made fast to the rafters of the stall, or other convenient supports. Properly made slings are provided with a breastplate and breeching to prevent the horse slipping forward or backward, and a chain block is used to lower or raise the slings at pleasure.

Slings, when used, should lightly touch the abdomen of the horse when he stands up, so that he may rest in them, or not, as he chooses. The animal should never be suspended in them; as, in that case, they would interfere with his breathing and digestion. Employed as I have advised, he will readily accept the offered support, if he is in need of it.

Steaming the Nostrils

Is very useful in cases of inflammation of the air passages. It may be done by soaking hay in boiling water, and then placing it in a nose bag, which is to be put on the horse's head. Two nose bags may be alternately employed. A better arrangement might be made by a kettle, to the spout of which is attached a piece of india-rubber tubing to lead into a deep nose bag half filled with hay. The addition of 1 part of oil of turpentine to 4 or 5 parts of water, may prove very useful for steaming the nostrils in cases of bronchitis, and sore throat. In these affections, I would suggest the employment of inhalations from carbonate of ammonia, say, an ounce of which might be placed in a nose bag to be put on the horse's head. It will not require the aid of heat.

Sutures.

See page 176.

Subcutaneous (hypodermic) Injections

Are made by a needle-pointed syringe, which is manufactured for the purpose. The syringe, after being filled, should be held with its point uppermost, and the piston slightly pressed, so as to allow the bubble of air that would otherwise remain, to escape. If this be not done, the entrance of the bubble of air underneath the skin may give rise to an abscess. The skin, at the point chosen, being pinched up between the fore-finger and thumb of the left hand, the syringe is taken in the right hand, and its point is pressed into the fold of skin at the lowest point, and is carried forward a little way, care being taken not to hurt the flesh. The fluid is, then, gradually, forced out by the pressure of the right thumb, and after a minute or two, the syringe is slowly withdrawn. The finger should be applied for a little time to the orifice, so as to prevent the fluid from escaping.

Solutions for subcutaneous injection may be obtained of uniform strength from druggists. "We may note that most hypodermic solutions are readily destroyed by mould; and that Dr. Sansom has suggested a very handy series of gelatine disks, which will keep well in all climates, and which may readily be melted down when required for use." (*Dr. Robert Farquharson.*) If the injection hold undissolved particles in suspension, it is very apt to set up inflammation at the part pierced, and bring on an abscess. In case of doubt, the solution should, therefore, be filtered a couple of times through blotting paper.

Owing to the risk of irritation to the part, but few medicines can be used subcutaneously. Morphia and atropine are the two agents which are most commonly employed for this purpose.

Thermometer, Use of the Clinical.

This instrument is employed for taking the internal temperature of the body, which is best done by placing the instrument in the rectum of the animal for about three minutes ; before doing which the rectum should be cleared of dung.

The natural internal temperature of the horse is about 100·5° F. As an approximation, we may say that a rise of more than 1½° is not compatible with health.

The indications afforded by the clinical thermometer are unerring guides as to the state of the animal's health at the time, or to what it will shortly be. Thus, if there be a rise of three or four degrees without the animal evincing any other sign of illness, we may be assured that disease, in some form, will, after a day or two, manifest itself in him. A rise of five or six degrees points to a condition of great danger.

The rise of temperature appears to be due to rapid waste of tissue, at a time when the skin is inactive, and when the extra heat evolved is not converted into motion, as it would be were the excessive waste due to violent exertion. This thermometer is specially useful for indicating the state of the horse during fevers and other inflammatory illnesses. A fall in the temperature, when it has been abnormally high, will generally point to a favourable termination of the disease.

Tracheotomy

Is the operation of making an opening in the windpipe, when, from any obstruction in the nostrils or throat, the horse is unable to breathe freely. It may be employed in cases of acute disease, or to give relief to bad roarers. The operation is very simple. A twitch being put on the horse, and his head elevated, the operator should select a spot on the centre line of the throat, about a third of the way down the neck, where the hard cartilaginous rings of the windpipe can be distinctly felt between the small muscles on each side. (The rings partially overlap each other.) A longitudinal cut is made through the skin and between these muscles—care being taken not to injure them—so as to expose the windpipe. A sharp-pointed knife is then inserted into the centre of one of these rings and a longitudinal opening is made to the centre of the next ring. The incision is thus made, so that, when the opening is no longer required, the edges of the wound may unite without any displacement. If, on the contrary, the rings be cut clean across, they might be found to overlap on the healing of the wound, which would cause a certain contraction of the windpipe at the part operated upon, with the probable result of some impediment to the animal's breathing. A tracheotomy tube may be inserted, or a piece of twine may be passed, by means of a suture needle, through each end of the severed ring and tied on the top of the neck. This will prevent the wound closing during inspiration. The usual form for a *tracheotomy tube* is that of a plated block tin pipe, which can be fixed in the windpipe by means of a movable piece of metal. The tube may be taken out when it is no longer required. No sutures or any special treatment is necessary for the wound, which heals up with remarkable quickness.

Twitching

The ordinary twitch is a staff about two inches in diameter, two or three feet long, and furnished with a loop of cord which is passed through a hole bored at one end of the stick. The thickness of the cord should not be less than that of one's little finger, and should be made of soft material so as not to cut the horse's skin. The loop should be large enough to admit the hand freely.

When applying the twitch, the staff is held in the right hand. The left hand passes through the loop and grasps the horse's muzzle. The cord is then slipped over the fingers and the staff is twisted round by the right hand so that the horse's muzzle becomes tightly squeezed by the cord. When fixed thus, the animal will generally keep quiet during ordinary operations; for if he makes any movement he will be hurt severely by the twitch.

This instrument may be easily improvised by placing a loop of cord round the muzzle and tightening it by a stick passed through it, and then twisted round and round until sufficient compression be obtained.

The twitch is sometimes put on one of the ears; round the lower jaw, over the space bare of teeth and under the tongue; or round the gums of the upper front teeth. The first-mentioned operation is objectionable, as it is apt to make the horse, for the rest of his life, unwilling to have his head touched; and the second is liable to hurt his mouth and render it unfit for the bit for a long time.

In my *Illustrated Horse Breaking* (Thacker and Co., London), I have described, with illustrations, a much improved method of twitching, which is free from the grave objection, possessed by the ordinary method, of rendering horses shy of being bridled, or otherwise handled about the mouth.

CHAPTER XXIII.

SHOEING.

NECESSITY FOR SHOEING—MECHANISM OF THE HORSE'S FOOT—WEIGHT-BEARING SURFACES OF THE FOOT—FORM OF THE HEALTHY FOOT—PREPARATION OF THE FOOT—THE SHOE—NAIL HOLES—FITTING THE SHOE—PUTTING ON THE SHOE.

Necessity for Shoeing.

ALTHOUGH saddle and light harness horses may do easy work without shoes on unmetalled roads in countries where the soil is exceptionally dry; still, in the great majority of cases, it is practically impossible for them to perform even a fair day's task unshod on a macadamised track, especially if the ground is wet, as it usually is in England; for the horn of the hoof will become soft and pulpy, from the fibres absorbing moisture. In many parts of India, as in the indigo districts, horses that have good enough feet to do light work unshod on unmetalled roads during the dry season, have, almost invariably, to be sent to the blacksmith as soon as the rains commence. Not alone has water a directly weakening effect on horn, but, also, the hoofs of horses which are bred in damp climates are softer and weaker than those of animals raised in dry climates. The enthusiasts who advocate the insane practice of working horses unshod in England, on the plea that use would confer the necessary strength on the hoofs, are ignorant of the fact that even those of breeds that, for ages, have been employed without shoes in exceptionally dry countries, as in the Salt Ranges of the Punjab, have been proved, times without number, to be incapable of performing work on wet metalled roads, or even, in most cases, when such roads are dry, unless their feet were artificially protected. How, then, may I ask, could English horses, which are reared in our damp climate, and which have, naturally, hoofs of not half the strength and hardness of the Eastern animals, be expected to work unshod? When we come to heavy draught labour, the idea appears still more preposterous; for we find that many of our cart horses actually wear through a greater thickness of iron during a month, than there is horn secreted; so that, were we to endeavour to harden their feet, by using them unshod, we should have to wait until the horn of their feet was harder than iron, before our object would be fulfilled! Again, I may ask, would shoes have been generally adopted, had not experience taught horse-owners the imperative necessity for their employment under modern and civilised requirements?

Young horses require to be shod, or their shoes removed, oftener than older animals; as the horn of their feet grows faster. A three or four year old should, generally, have his shoes taken off every three weeks; though an aged horse may go a week longer.

Mechanism of the Horse's Foot.

As far as I am aware, this subject has never before been discussed in any English publication; a fact which cannot be attributed to its being either unimportant or uninteresting.

The Foot as a Lever.—I may explain to those of my readers who are unacquainted with anatomical mechanics, that the movements of the limbs are due to the action of muscles on the bones.

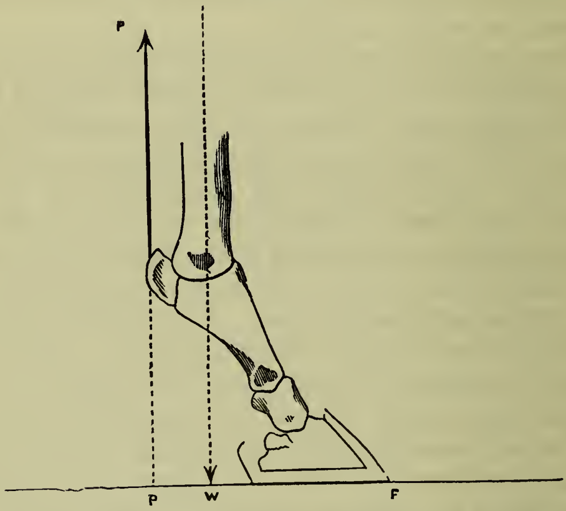
A muscle (which is the lean part of meat) has the power of contracting in length on being stimulated by its nerves. Muscles are attached to bones, as a rule, by tendons, which are hard and inelastic continuations of their respective muscles.

If we regard the muscle which bends the foot and aids in raising it from the ground, we shall find that it lies at the back of the forearm; that it is attached at it upper end to the bones near the elbow, and at its lower end by a tendon (the *flexor perforans*, see Fig. 1) which runs down the back of the leg, at and below the knee; passes over the back of the fetlock; goes down the back of the pastern; and is finally attached to the base of the pedal (coffin) bone. This tendon forms one of the two well-known "back tendons." When the horse is standing at rest, both the tendon and its muscle are "on the stretch," by reason of the back of the fetlock pressing against the tendon. On the signal being given from the brain, the nerves of this muscle stimulate it to contract, and on its becoming shorter, the pastern and fetlock joints are bent and the heel raised. If we look from a mechanical point of view upon the action of this muscle, we shall perceive that we have a lever of the second order at work (see Fig. 33). We have the *weight* (W) impressed downwards by the cannon bone; the *power* (P) acting upwards by the pull on the tendon due to the contraction of the muscle; while the *fulcrum* (F) is the ground at the toe. The relations of power and weight may be expressed as follows :—

P : W : : WF : PF.

Hence (a conclusion that requires no mathematical knowledge), the further away the toe is from a perpendicular drawn through the pastern joint (when the animal is standing at rest), the greater will be the strain thrown on the back tendons, both when standing still and during movement. From this we may draw the following practical deductions :—

Fig. 33.



(1) That the longer the hoof is allowed to grow (supposing the heel and toe to increase equally in length), the severer will be the strain on the back tendons; for the effect of this will be to still further remove the toe beyond the perpendicular which passes through the fetlock joint.

(2) The same will occur if the heels be lowered without reducing the toe, or if a shoe with a thick toe and thin heels be used.

(3) The strain on the tendons will be lessened if the reverse of the operations described in (1) and (2) be performed.

The Foot as a Spring.—Besides the action of the foot as a lever, we have it also as a spring; the mechanical advantages of the one being directly opposed to those of the other. Thus, the better the leverage, the worse the spring. It is evident from the considerations already discussed, that the lower the heels with relation to the toe and the more sloping the pastern, the greater freedom does the leg enjoy from concussion; although its power derived from the back tendons will work at a greater mechanical disadvantage.

Fig. 34.

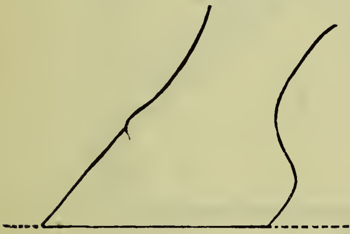
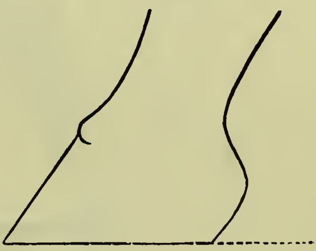
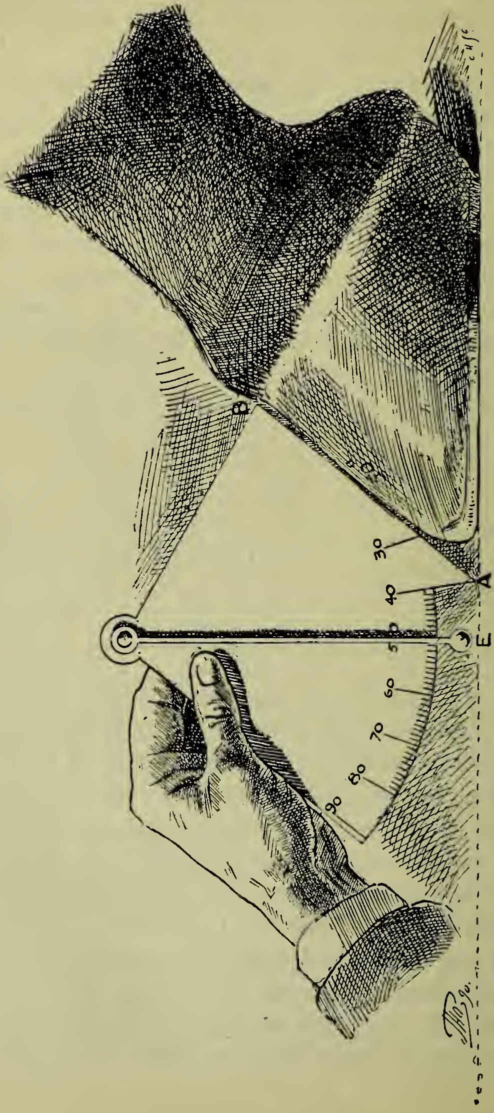


Fig. 35.



Comparative Leverage and Spring of the Fore and Hind Feet.—Were there no such thing as injury to the limbs from concussion, we would naturally get the hoof as upright as practicable so as to allow the back tendons to work at the greatest possible mechanical advantage. The bad effects of concussion have, however, to be provided for, especially as regards the fore-feet, which are much more liable to suffer from them than are the

Fig. 36.



hind feet. It is impossible to determine with exactness the proper respective slope of the fore and hind hoofs; but from an examination of a large number of feet which have never worn iron, I may say that the former should be about 50° and the latter not less than 55° (see Figs. 34 and 35). It is very instructive to note that a considerable amount of power of propulsion is lost by the angle of inclination of the hind feet being too small. This is a practical point which is very important to owners, and especially to those who keep race-horses.

Measuring the Slope of the Hoof.—Fig. 36 will explain the action of a clinometer which I have devised for this

Fig. 37.

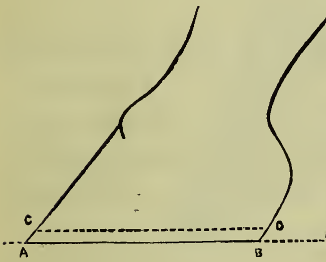
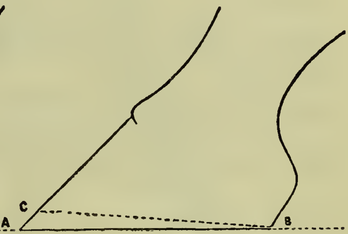


Fig. 38.



purpose, and which can be made out of a piece of wood, ivory, metal, card-board, or other suitable material. It is provided with a plumb line.

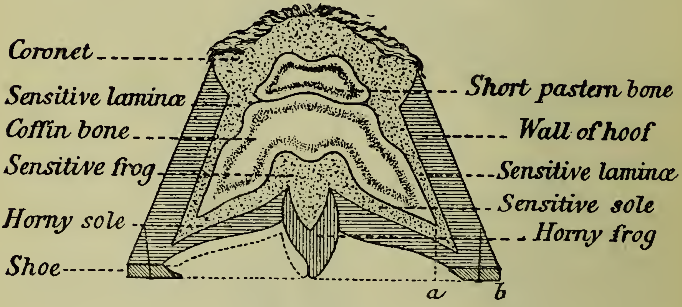
Lowering the Hoof.—If the foot is of the proper slope, but too long, it should be reduced equally at heel, quarters, and toe (see Fig. 37). If the toe be too long, but the heel of right height, the toe should be lowered in a straight line to the heels, which should not be touched (see Fig. 38); and *vice versâ.*

Weight-bearing Surfaces of the Foot.

The horn of the wall, sole, frog and bars is secreted by a membrane which, to borrow the words of Chauveau, covers a portion of the coffin bone and soft structures of the foot, like a sock; while the hoof acts the part of a shoe. As this membrane is highly sensitive, the ground surface of the foot is designed so that the necessary weight-bearing points may be obtained without injury to it. With this object, that portion of the sole which is immediately underneath the coffin bone, and which is protected by hard horn, is constructed in the form of an arch; for were it level, the membrane would, at every step, be in danger of becoming pinched between these two hard substances—the sole, and the coffin bone. The weight-bearing surfaces, therefore, are as follow:—(1) the

FIG 39.

CROSS SECTION OF HOOF VIEWED FROM BEHIND.



Right-hand side of figure shows the shoe properly adjusted with the natural weight-bearing surfaces of the foot preserved in their entirety; on the left side, the shoe is "seated," and the sole and frog cut away.

a b = maximum width of weight-bearing surface of wall and sole.

ground surface of the wall and that portion of the sole which is not directly underneath the coffin bone (see right-hand side of Fig. 39); (2) the frog, which is endowed with elasticity, so that it may bear pressure without hurting its secreting membrane; (3) the bars, which are continuations of the wall. We may readily see that the weight-supporting functions of the frog, outer portion of the sole, and bars, should be fully utilised; for if the wall alone be subjected to concussion, the resulting strain on that portion of the secreting membrane which the wall covers, namely, the sensitive laminæ, may become so excessive, that laminitis may ensue. The weight-bearing surface at the toe is far broader than at the heels; for the slope of the foot is less, and the thickness of the wall greater, at the former, than at the latter. That portion of the sole—"the seat of corn" (see Fig. 12, page 125)—which lies in the angle formed by the wall and the bars, should on no account bear weight; as the sole is thinnest at that part; and, hence, the secreting membrane above it is, as we are all aware, peculiarly liable to injury.

In order to meet the wear and tear to which the foot is subjected by contact with the ground, when the animal roams about under natural conditions, the horn of the wall is endowed with the property of growing to a practically indefinite length; though the horn of the sole and frog will not increase beyond a useful limit. The thickness of the sole is naturally regulated by its outer layers of horn exfoliating (flaking off), when the sole has reached its proper thickness. The frog cannot, under ordinary conditions, grow too long; firstly, because its outer layers, also, flake off; and, secondly, because it will stop increasing, as soon as it is relieved of pressure by reason of the more rapid growth of the wall. As we require, when shoeing, to utilise the whole of the weight-bearing surface at our disposal, as well as to preserve the secreting membrane from injury, we may conclude that the frog and the arched portion of the sole should be left untouched by the knife or other instrument, and that the wall and bars should be kept sufficiently "short," so as to allow the frog and outer portion of the sole, also, to support weight.

Form of the Healthy Foot.

1st. The frog is large and comes well down on the ground, so as to act as a buffer in diminishing the effects of concussion, and also, by its form and nature, to prevent the animal from slipping.

2nd. The sole is thick, strong and arched.

3rd. On level ground, the weight bearing surface of the foot is composed of the frog, wall, bars, and the outer portion of the sole.

4th. The slope of the fore-foot, viewed in profile, will, as a rule, be about 50° ; while that of the hind feet will be from 55° to 60°. This difference in obliquity between the hoofs of the different extremities, is due to the fact, that the hind feet are chiefly designed for propelling the animal, while the fore-feet are principally intended for supporting his weight; hence, the wear of the former, at the toes, is greater than that of the latter. The slopes that I have taken for both fore and hind hoofs, are an average of those I have observed, from time to time, among a number of unshod horses ; for I have felt justified in assuming that, as the unprotected hoof readily wears down by friction with the ground, it will assume the slope best fitted for performing its functions.

Preparation of the Foot.

As the shoe ought to be employed simply as a protection against excessive wear of horn, it should be applied in such a manner that it will interfere, as little as possible, with the natural shape and uses of the foot. Hence, previous to its being put on, the hoof should be brought into a natural shape, as regards its slope and weight-bearing surfaces; except that the wall and outer portion of the sole should be reduced so as to allow for the thickness of the shoe. Although the horn of the hoof grows equally fast all round; still, when the animal is shod, the shoe, being immovable at the toe, protects it from wear, while the heels are being constantly battered down by the iron of that part. Hence, when the shoe has been on for some time, the toe will require to be reduced much more than the heels. As a rule, in order to allow for the thickness of the shoe, the toe will require to be reduced as much as possible, without, however, running any chance of making the horse go tender. It is advisable, therefore, to begin by lowering the foot without touching the heels; and when the toe is sufficiently short, we may, then, see if we cannot lower the heels without injuriously affecting the slope of the foot. Ignorant blacksmiths, usually, imagine that "shortening" the toe means rasping down the toe from the outside. After this reduction of horn, the weight-bearing surface of the wall and sole should be perfectly flat. Any "thinning of the sole," "opening out the heels," paring down the frog, or cutting away the bars, should on no account be allowed; beyond slightly easing off the "seat of corn" with the drawing knife, so that the shoe might not press on it, and removing any loose portions of the frog in order to prevent the lodgment of moisture, which would tend to produce thrush. In the reduction of the foot it is, perhaps, safest to restrict the shoeing smith to the use of the rasp only. Care should be taken that the heels and quarters are kept level. If the heels are unnaturally low, allowance should be made by the employment of thick-heeled shoes. "When the circumference of the hoof has at length been brought to a condition to receive the shoe, the rasp must finish its task by removing the sharp edge, and rounding it so as to leave a thick strong border not likely to chip. The unshod hoof nearly always exhibits this provision against the fracture of the wall-fibres." (*Fleming.*) When a horse goes barefoot, this, also, should be done.

I may observe that, formerly, it was the custom to mutilate the horse's foot in various ways with the erroneous view of causing the heels to "open out," or to prevent them from contracting. An examination of the animal's foot shows us that the horn at the heels is secreted by the membrane which is wrapped round the ends of the wings of the coffin bone. Hence, it is impossible to really open out the heels without first fracturing the coffin bone. The horny heels undoubtedly "wire in," if they are allowed to grow too long; but this is a mere temporary condition. To use Professor Williams' words, the hoof is a "simple horny box," which neither expands nor contracts, as these terms are popularly understood. The foot, like all other structures, is, of course, liable to waste away from want of use; and it may be strengthened and enlarged by being well exercised, though not by any mechanical contrivances for opening it out.

The Shoe.

The following considerations should determine the shape of the shoe:—1st. The foot surface of the shoe should be flat, so that the outer portion of the sole may aid the wall in bearing weight. *Seated Shoes,* namely, those that are bevelled on the foot surface, are, for ordinary work, wrong in principle, and were invented in those barbarous times when it was considered correct to pare the sole so thin, that it would yield to the pressure of the thumb; hence, under this system, all weight had to be taken off the denuded sole. The bevelling of a seated shoe may be utilised for applying remedial agents to the sole in cases of disease or injury. (See page 83.)

2nd. In order that the frog may bear weight, the shoe should, generally, be as thin as possible, consistent with its standing wear and retaining its shape.

3rd. The shoe should, as a rule, be of a uniform thickness at the toes, quarters, and heels, so that the proper "bearing" of the foot be not disturbed.

4th. The shape of the foot surface of the shoe should follow the general form of the weight-bearing surfaces of the wall and sole. Hence, it should be broad at the toes, and, comparatively, narrow at the heels; provided, always, that, at the latter part, the web is broad enough to rest on the bars, as well as on the wall of the heels. As the shoe is not fixed by nails at the heels, a little margin should be left, in the event of the shoe shifting, or of its heels opening out. If such a contingency happened, without allowance having been made, the horn of the heels would run the risk of being knocked to pieces, which would, of course, be most undesirable; for the shoeing smith will, generally, find considerable difficulty in keeping the heels high enough. Narrow-heeled shoes which are made to follow the shape of the ground surface of the wall at the heels, and which are recommended by one of our most eminent authorities, appear to me to be wrong in theory; for they do not permit weight being borne on the bars. They are, also, defective in practice, on account of allowing no margin for accidental shifting, etc.

When the heels of the hoof are unnaturally low, thick-heeled shoes may be employed.

5th. Care should be taken to make the heels of the shoes, on their foot surface, perfectly flat, or, if anything, to slope slightly outwards; so that the heels of the hoofs may have no tendency to contract, on account of resting on surfaces that slope inwards.

6th. The shoes should be made to project slightly beyond the ends of the heels, without any risk being run of a fore shoe getting caught by a hind shoe; so that the heels of the shoe may rest on the solid pieces of horn that are found immediately behind the angle formed by the wall and bar. If the heels of the shoe terminate in front of these surfaces, they will become imbedded in the softer horn in front, and it will be impossible to keep the hoof at its proper slope, without using thick-heeled shoes.

7th. The ground surface of the shoe should be bevelled, in order to increase the foot-hold of the horse and, also, to lessen the weight of metal employed.

The use of too heavy shoes, not alone causes the feet to carry an unnecessary burden, but it, also, necessitates the employment of large sized nails which are apt to injure the wall to a serious extent.

Besides bevelling the shoe, the admirable heel catch proposed by Dr. Fleming, may be adopted, or the outer hind heels may have calkins; while the inner ones may be thickened for ordinary hacks and trappers. I think, however, I am right in saying that, as a rule, such horses go safer, sounder, longer and faster, when their frogs are allowed to come on the ground, than when the ends of the shoes are turned down. If, however, calkins have to be employed, they should be made not more than a third of an inch in height, and the horn at the heels should be proportionately reduced. Calkins on the outer hind heels of the shoes of a 'cross country horse, are, often, of great assistance to him in preventing him from slipping, when jumping. Heavy draught horses that are not required to go out of a walk, may have calkins on the inner and outer heels, both before and behind; though whatever contrivance is adopted, care should be taken that the natural slope of the foot is maintained. Hence, it is generally advisable with them, to apply, at the same time, "toe-pieces," which will give greatly increased power, and will also allow the foot to preserve its natural position. To obtain the advantages derived from the employment of calkins and "toe-pieces," we necessarily lose the benefit of frog-pressure.

"In cart-horses, frog-pressure does not appear to be an essential for the preservation of well-formed feet." (*Reynolds.*)

If the shoe is not already bevelled, the inside edge of the ground surface of the hind shoes at the toes should be rounded off, so that the horse may injure himself, as little as possible, in case he happens to over-reach. Fore shoes may have clips in front. Hind shoes should have side clips, and the toes should be made square—leaving an overlapping rim of crust at the toe which should be rounded off with the rasp—in order to lessen the chance of over-reaching.

I cannot too strongly condemn the practice, which is carried on in some forges, of invariably applying thick-heeled shoes. To such an extent is this observed, in some instances, that I have frequently seen the heels of sound strong feet cut down, simply to suit these shoes, the habitual use of which is rarely necessary. The still more injurious practice of employing shoes thinner at the heels than at the toes, with the view of obtaining increased frog pressure, has become obsolete; as it was found to cause an injurious amount of strain to be thrown on the suspensory ligaments and back tendons.

For ordinary saddle horses, shoes weighing from eight to ten ounces each, will be heavy enough.

In the foregoing remarks, I have confined myself to the consideration of the ordinary shoe with certain modifications; as it is the most suitable one for general requirements; although the Charlier shoe may be used in many cases with advantage.

A *bar shoe* for a fore-foot—to be used when the horse is at work—should be made heart shaped (see Fig. 40); so that it may not get caught by the hind shoe.

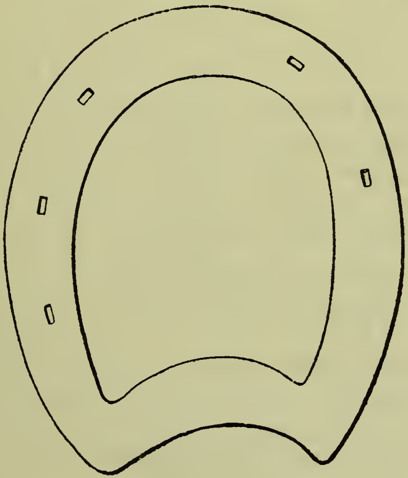
A *three-quarter* shoe has one side shorter than the other; so that, when it is on, the wall on the short side, measuring from the heel, is uncovered for a distance of about 2 inches or a little more. This shoe is useful for relieving, from pressure, the parts near a "corn."

Thin shoes, especially if they be of soft iron, should be fullered; for if this be not done, and the nail be driven flush with the ground surface of the shoe, the nail hole will soon work too big for the head of the nail. If, however, the nail heads project beyond the ground surface of the shoe, they will quickly get worn down, or knocked off; the result being, in either case, that the horse will drop his shoe. With a fullered shoe, the heads of the nails being larger than the nail holes, while keeping the shoe on, will lie protected in the groove.

Nail Holes.

If a shoe be made of hard iron and has plenty of substance, it should not be fullered; for, if this be done, it will be difficult to alter the distance of the nail holes from the outer edge, if required. The holes should be punched square and to narrow downwards (looking at the shoe when the foot is "picked up"). "The square cavity, wide at the top, and tapering to the bottom, gives a secure and solid lodgment to the nail-head, which, of course, should be of the same shape; it does not weaken the shoe, is easily made, can be

Fig. 40.



placed nearer the outer or inner margin as required, and when filled with the nail is as capable of resisting wear as any other part." (*Fleming.*)

Shoeing smiths, as a rule, make the mistake of punching the nail holes too near the outside edge, which necessitates the baneful practice of fixing the shoe within the circumference of the crust. If the outside edge of the shoe, with its nail holes punched in this manner, were made to coincide with the edge of the wall, the hold which the nails would then have, would be too slight to retain the shoe in its position for any length of time. By setting the shoe within the circumference of the crust—in order to obtain more hold for the nails—there is a rim of horn left round the shoe, which rim, for the sake of appearance, has to be rasped down. This practice, therefore, accounts for the all but universal use of the rasp on the lower part of the wall, among ignorant shoeing smiths, who, having accepted a false system of punching the nail holes, are forced, in order to keep the shoe on, to fix it in a manner which necessitates the use of the rasp on the outside. If a horse owner insists on making one of them fit such a shoe exactly to the circumference of the hoof, and if it, from insufficient hold, comes off in a few days, the fact of its doing so will be a convincing proof to the shoeing smith of the excellence of his own views on the subject, and of the absurdity of his employer's new-fangled ideas.

For a foot with a full amount of horn, $\frac{3}{10}$ths of an inch will be about the proper distance that the nail holes should be from the outside edge of the shoe on its foot surface: a little more towards the toes, and a little less towards the heels.

As a rule, the nail-holes should not be punched before the foot is ready for the shoe to be applied to it; so that the smith may avoid the parts of the crust which may have been pierced by the old nails, or which may have become chipped or split.

Fitting the Shoe.

As the old and true adage expresses it: "The shoe should be made to fit the foot, and not the foot to fit the shoe." The external margin of the shoe should accurately coincide with that of the hoof. If that portion of the shoe which is behind the last nail hole, be "set" within the outside edge of the wall, it will be very apt, from constant hammering on the ground, to become imbedded into the horn near the heels, which will, consequently, become unduly lowered.

For horses used in ordinary light work, it is a clumsy and unworkmanlike practice to leave a large margin of shoe on the outside of the heels, so as to give the foot a false appearance of being open at the heels. It may, possibly, be advisable to do this with heavy cart horses that have calkins to their shoes, in order to give them increased foot-hold.

If practicable, the shoe should be fitted on at a red heat, and not when cold. The advantages of the former over the latter practice are as follows:

1st. The shoe is more readily brought into the required shape.

2nd. Exact juxtaposition between the iron and the hoof is obtained, with, consequently, increased security.

3rd. The bearing surface of the wall and sole is rendered impervious to water.

4th. The heat renders the horn less liable to split, when the nails are being driven.

The heels should on no account be "sprung," that is, no space should be left, at the heels, between the iron and the horn; for if this be done, the heels of the foot will be subjected to a constant process of hammering, while the horse is in motion, and will, consequently, be liable to become battered down, Corns may, also, be produced from the same cause.

Putting on the Shoe.

The nails should take a short, thick hold of the crust, and should not come up higher than one inch from its lower margin.

After the nails are driven, the rasp should not touch the crust, except to file, if necessary, a little of the thin horn from underneath the ends of the nails, so that the clenches, when they are turned down, may be properly supported.

I may remark that the external surface of the wall of the hoof is covered by a thin horny layer (the periople), which gives it a smooth and polished appearance, and which also protects the fibres of the wall from the injurious effects of moisture, dirt, etc. This horny layer should, therefore, as far as possible, be preserved intact.

Unless a horse is inclined to brush, the clenches should not be filed down; and, then, only those on the inside quarter.

"Driving" nails is such an entirely practical art that I need make no remarks about it.

ADDENDA.

Sprains (*see* page 14).

The remark on page 14, line 7, about the suspensory ligament being inelastic, has been made agreeably to the view held by the majority of English veterinary surgeons. French anatomists regard it as being elastic to a slight extent, and point to the presence in it of bundles of muscular fibres.

Hot Water (*see* page 26, line 25).

The temperature should be about 140° F. Continued contact of water raised up to 150° F. will injure the skin.

Cotton Wool Bandaging (*see* page 27).

An alternative plan which is probably the better of the two, is to apply the bandage, in the manner directed, with only a very moderate degree of pressure ; and then put on another bandage (3 inches broad and 6 yards long) over the whole, as tightly as one can draw it with the hand. By this method there is no danger of the pressure being unequally distributed.

Splints (*see* page 138).

Since writing the explanation, given on page 138, of the more frequent occurrence of splints on the inside than on the outside of the leg, I have read the same in M. Merche's work on Conformation. I must have got the idea from it, though I quite forgot the source of my information ; for I now remember reading M. Merche's book many years ago. It contains the following passage :—"*Le péroné* [small splint bone] *interne s'articulant par sa facette diarthrodiale supérieure avec le dernier des os carpiens qui s'appuie sur lui seul et lui transmet intégralement, en virtu de sa mobilité tout l'effet qu'il subit. En dehors, il ne pouvait être aussi frequent, puispue le péroné ne support que la moitie du poids que lui transmet l'os externe de la rangée inférieure du carpe.*"

Wounds of the Abdomen (*see* page 204).

In the *Veterinary Journal* of 1891, Mr. M. Murphy, F.R.C.V.S., gives an interesting account of a thoroughbred mare having staked herself near the udder when jumping, with the result of a considerable protrusion of the intestines. An improvised suspensory bandage was made for them with handkerchiefs and a whip thong. In order to get her out of the field in which she was, she had to be jumped over two banks, and was then walked home for five miles. The day on which this occurred was frosty. The mare was thrown by hobbles; precautions being taken to render her falling soft, and to prevent injury to the escaped bowels. The intestines which had previously hung down to her fetlocks, took about an hour to get returned ; the lips of the wound were closed by a skewer, round the ends of which tow was passed in a figure of **8**; the mare was allowed to rise; and she made a rapid recovery. "Carbolised oil was used as a dressing, and the wound was cleansed daily with warm (carbolised) water."

In all such cases, chloroform, if procurable, should be given, after the animal is thrown, before attempting to return the intestines, the surface of which should be cleansed from any dirt or other foreign matter, and should be treated, before being put back, with a weak antiseptic, such as 5 grains each of corrosive sublimate and common salt, to a pint of water; or ½ oz. of Jeyes' Fluid to the same quantity of water. Great care should be taken to avoid injury to the intestines. If they be punctured, the wound in them may be closed by one or more stitches of carbolised catgut, which can be procured at any chemist's shop.

Capped Hock (*see* page 250).

In the treatment of capped hock, Mr. J. Anderson, late I.V.S. Bombay Army, advises that a paste made of whiting and vinegar should be applied to the part. It may be brushed off when the horse goes out to work, and put on again when he returns.

Relapsing Fever, or Surra (*see* page 359).

Dr. George Ranking, Surgeon-Major 5th Bengal Cavalry, has made a series of most interesting investigations on the nature of this disease. I had the pleasure, at Lucknow, last April (1891), of meeting Dr. Ranking, who showed me several specimens of the blood of the affected animals, the appearance of which under the microscope (Zeiss's 1-12 Hom. Imm. lens) certainly seemed to bear out his conclusions. As I had not an opportunity of examining, when they were alive, the animals from which the blood was taken, and as I had no time to go into the matter fully, I am unable to give any definite opinion, which would be improper, knowing as I do that Dr. Ranking is going to publish the results, *in extenso*, of his research. To indicate the gist of his conclusions, I make the following extracts from "A Preliminary Note" which he has printed, and of which he has kindly sent me a copy:—

"In 1889 no less than fifteen horses and thirteen mules of this regiment died of surra. In 1890 the loss was eleven horses and seven mules. I must premise that in calling the disease which I have been investigating 'surra,' I have relied upon the diagnosis of the veterinary surgeons under whose treatment the animals were at the time I undertook the research. They were agreed that the disease was true surra, and this diagnosis was borne out by its fatality.

"*Symptoms of Surra.*—Its symptoms may be briefly described as a progressive anæmia, with lassitude, emaciation, conjunctival petechiæ, abundant urine, and ultimately death from sheer exhaustion. . . . .

"*Pyrexia in Surra.*—The course of the disease in surra is characterised by a fever of a remittent or intermittent type, with irregular exacerbations, and not often rising beyond 104° F.; falling, however, as low as 98° F. The highest temperature may be followed by a gradual fall, and rise gradually till, after an interval of five or six days, the maximum is reached, when it again falls, to be succeeded, as before, by a gradual rise; or, in another case, there may be diurnal exacerbations, the temperature chart reminding one forcibly of malarial fever in the human subject. I have before me ten charts of cases of surra in the horse and mule, which all conform to one or other of the above descriptions."

Dr. Ranking goes on to say that in the blood of all the affected animals which he examined he found an organism (bacillus) similar to the one which is regarded as the cause of ague in man. "It is invariably present, and conforms in all particulars to the requirements of Koch's postulates, that is to say:

"1. It is found in the blood.

"2. It can be isolated and cultivated.

"3. The pure cultivation reproduces the disease.

"4. The organism is again found in the blood.

"*Malarial Infection the cause of Surra.*—I am therefore of opinion that surra is a disease of malarial origin, comparable to ague."

It is interesting to note that only in one specimen did he find the spirillum which has hitherto been considered to be the effective cause of surra. This spirillum, I may mention, was observed by Dr. H. Vandyke Carter in the blood of healthy rats (see *Scientific Memoirs of the Medical Officers of the Army of India*, Part III., 1888). Of the last four cases in the 5th Bengal Cavalry, "one was moribund when first seen, and was shot as a hopeless case; one died of tetanus, and the other two are rapidly recovering;" the treatment (suggested by Dr. Ranking) being quinine in 15 grain doses [I would suggest double or treble that amount] three times a day, and means (by milk, iron, and arsenic) to keep up the general health. Mr. Pallin, A.V.D., who had veterinary charge of the 5th Bengal Cavalry at the time, told me about the recovery of at least one of the cases mentioned by Dr. Ranking, with whose conclusions he appeared to be in thorough agreement.

Sunstroke (*see* page 457).

In the treatment of sunstroke I would suggest the hypodermic injection (see page 574) of a solution, in water, of tartar emetic, say 20 grains; as this drug has been found to have a very good effect in cases of apoplexy in human practice. We might, if the animal could swallow, give ½ oz. of quinine or phenacetin, both of which serve to reduce the internal temperature. A quarter of that amount of quinine might be used hypodermically.

Chloroform Giving (*see* page 553).

The following are some of the practical conclusions arrived at by the Second Hyderabad Chloroform Commission:

"I. The recumbent position on the back and absolute freedom of respiration are essential.

"IV. An apparatus is not essential, and ought not to be used, as, being made to fit the face, it must tend to produce a certain amount of asphyxia. Moreover, it is apt to take up part of the attention which is required elsewhere. In short, no matter how it is made, it introduces an element of danger into the administration. A convenient form of inhaler is an open cone or cup, with a little absorbent cotton inside at the apex.

"V. At the commencement of inhalation care should be taken, by not holding the cap too close over the mouth and nose, to avoid excitement, struggling, or holding the breath. If struggling or holding the breath do occur, great care is necessary to avoid an over-dose during the deep inspirations which follow. When quiet breathing is ensured, as the patient begins to go over, there is no reason why the inhaler should not be applied close to the face; and all that is then necessary is to watch the cornea, and to see that the respiration is not interfered with.

"VII. The patient is, as a rule, anæsthetised and ready for the operation to be commenced when unconscious winking is no longer produced by touching the surface of the eye with the tip of the finger. The anæsthetic should never under any circumstances be pushed till the respiration stops; but when once the cornea is insensitive, the patient should be kept gently under by occasional inhalations, and not be allowed to come out and renew the stage of struggling and resistance.

"VIII. As a rule, no operation should be commenced until the patient is fully under the influence of the anæsthetic, so as to avoid all chance of death from surgical shock or fright.

"IX. The administrator should be guided as to the effect entirely by the respiration. His only object, while producing anæsthesia, is to see that the respiration is not interfered with.

"XII. If by any accident the respiration stops, artificial respiration should be commenced at once, while an assistant lowers the head and draws forward the tongue with catch forceps, by Howard's method, assisted by compression and relaxation of the thoracic walls. Artificial respiration should be continued until there is no doubt whatever that natural respiration is completely re-established.

"XIII. A small dose of morphia may be injected subcutaneously before chloroform inhalation, as it helps to keep the patient in a state of anæsthesia in prolonged operations. There is nothing to show that atropine does any good in connection with the administration of chloroform, and it may do a very great deal of harm.

"XIV. Alcohol may be given with advantage before operations under chloroform, provided it does not cause excitement, and merely has the effect of giving a patient confidence, and steadying the circulation.

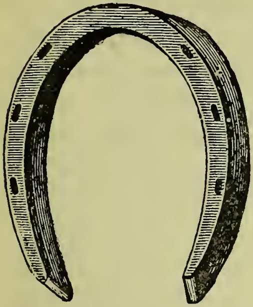
"The Commission has no doubt whatever that, if the above rules be followed, chloroform may be given in any case requiring an operation with perfect ease and absolute safety, so as to do good without the risk of evil."

With respect to the remark made on page 554 about a horse being cast before he is given chloroform, I may mention that although it is advisable to do so in ordinary cases, it would not be practicable in others, as in the event of a severe injury to any of the limbs. Chloroform can be administered with safety to a horse standing, if he be put in slings and secured so that he cannot hurt himself when struggling. The weight of the body should be, more or less, taken off the feet by drawing on the chain or rope by which the slings are suspended.

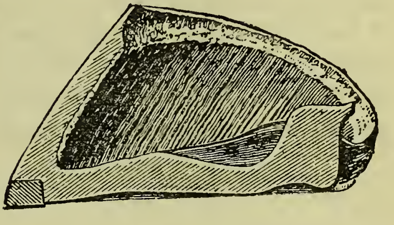
The Charlier Shoe (*See* page 594.)

The Charlier shoe (see Fig. 41) is a very narrow shoe of more than ordinary thickness, and is let flush into the hoof, so that neither the bearing nor the contour of the foot is altered by its presence (see Fig. 42). Its principle is that it is used merely as a ferrule to protect the wall from undue wear, without interfering with the natural bearing of the foot. In order to allow it

Fig. 41.



Fig, 42.



to be thus let in, a groove equal in depth and width to the shoe is first cut in the lower portion of the wall, right round the hoof (see Fig. 43). The advantage

Fig. 43.

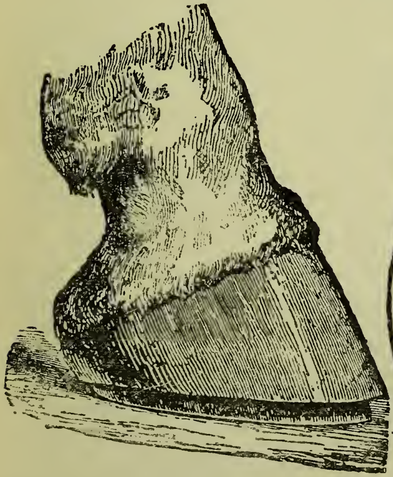
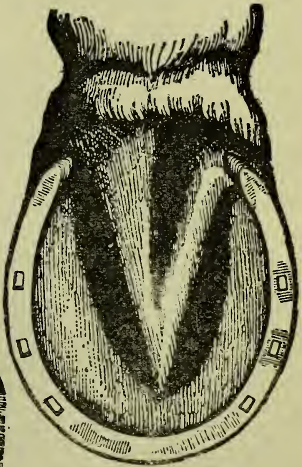


Fig. 44.



claimed for this system is that it brings the foot down on the ground in the manner intended by nature.

Without entering into a detailed analysis of its merits and defects, which would be out of place in this book, I may say that the application of these shoes demands more skill than is required for putting on ordinary ones; their employment on hard ground tends to make a horse lose his action; and they do not give such good results in work as the kind in general use. These shoes are specially applicable to horses that brush, speedy cut, or otherwise "interfere."

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